Los Angeles County

Repetitive Loss Area Analysis

FINAL

September 2016

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Los Angeles County
REPETITIVE LOSS AREA ANALYSIS

FINAL

SEPTEMBER 2016

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TABLE OF CONTENTS

Part 1—Planning Process and Project Background

LIST OF TABLES

LIST OF FIGURES

No. Title *Page No.*

Part 1 —
Planning Process and Project Background

CHAPTER 1.
INTRODUCTION

1.1 REPETITIVE LOSS PROPERTIES AND THE COMMUNITY RATING SYSTEM

A repetitive loss property is defined by the Federal Emergency Management Agency (FEMA) as a property for which two or more National Flood Insurance Program (NFIP) losses of at least $1,000 each have been paid within any 10-year rolling period since 1978 (FEMA, 2013). From 1978 through 2011, about a quarter of all claims paid under the NFIP nationwide were for repetitive loss properties, even though such properties make up fewer than 2 percent of all NFIP insurance policies (NFIP/CRS, 2011).

Federal programs such as the Community Rating System (CRS) encourage communities to identify and mitigate the causes of repetitive losses. The first step is to map repetitive loss areas, which are contiguous areas that include one or more properties on FEMA's list of repetitive loss properties and all nearby properties with exposure to the same or similar flooding conditions. FEMA considers listed repetitive loss properties to be indicative of an overall repetitive loss problem that may affect other nearby properties. Designation of repetitive loss areas around listed repetitive loss properties allows an evaluation of actual or potential flooding problems at properties that may not have flood insurance or may have had only a single previous claim. This ensures that all properties with the same exposure to a flood risk are addressed equally.

The CRS, which provides for reduced flood insurance premiums in communities that carry out various flood mitigation activities, requires the following from participating communities with 10 or more repetitive loss properties (Category C communities):

- Prepare a map of repetitive loss areas.
- Review and describe each area's repetitive loss problem.
- Prepare a list of the addresses of all properties in the repetitive loss areas with insurable buildings, which are defined to include the following (FEMA, 2013):
  - A structure that is affixed to a permanent site and has two or more outside rigid walls and a fully secured roof
  - A manufactured home (also known as a mobile home) built on a permanent chassis, transported to its site in one or more sections, and affixed to a permanent foundation
  - A travel trailer without wheels, built on a chassis and affixed to a permanent foundation, that is regulated under the community's floodplain management and building ordinances or laws.
- Undertake an annual outreach project to those addresses.
- Prepare a floodplain management plan or area analysis for the repetitive loss areas.

1.2 LOS ANGELES COUNTY REPETITIVE LOSS AREA ANALYSIS

Los Angeles County had 54 FEMA-designated repetitive loss properties in its unincorporated areas as of FEMA's last report on January 31, 2011. These properties have been mapped into 22 repetitive loss areas, and an analysis has been conducted for each area. FEMA prescribes the following five-step process for conducting an area analysis:

- Step 1—Advise all the property owners in the repetitive flood loss area that the analysis will be conducted.
- Step 2—Contact agencies or organizations that may have plans that could affect the cause or impacts of the flooding.
- Step 3—Collect data on the analysis area and each building in it to determine the causes of the repetitive damage.
- Step 4—Review alternative mitigation approaches and determine whether any property protection measures or drainage improvements are feasible.
- Step 5—Document the findings in a report.

This report documents the fulfillment of the CRS requirements for Category C communities, following the five-step area-analysis process. As required under Step 5, it provides the following information:

- A summary of the process followed (Chapters 2 and 3)
- Problem statements with maps for each area (Chapters 7 – 28)
- A table of basic information about each building in the area (Chapters 7 – 28)
- A description of alternative approaches considered to address the problem (Chapter 6)
- A set of recommended action items to address the problem (Chapters 7 – 29).

Individual properties and structures are counted and described in this document, but specific address information is withheld under the federal Privacy Act of 1974. A separate document on file with Los Angeles County for internal use only correlates the property ID numbers presented here with specific address information.

1.3 NUMBERING AND NOMENCLATURE

In designating federally recognized repetitive loss properties, FEMA assigns a seven-digit repetitive loss number (RL #) to each property, using a nationally defined numbering system. For the Los Angeles County Repetitive Loss Area Analysis, the 54 repetitive loss properties within the unincorporated county were renumbered 1 through 55 (the number 51 was omitted in a numbering revision). These numbers are referred to as RL Map numbers in this report.

Based on geographic distribution, repetitive loss areas were defined that include one or more repetitive loss properties. Areas were designated with a place name indicating the general location of the area. Table 1-1 summarizes the numbering and naming used in this analysis.

TABLE 1-1.
NAMING AND NUMBERING OF LOS ANGELES COUNTY REPETITIVE LOSS PROPERTIES AND AREAS

Repetitive Loss Area Name	Los Angeles County RL Map Number	FEMA RL #
Agua Dulce	37	#0091339
Altadena A	35	#0056933
Altadena B	36	#0091348
Calabasas A	26	#0072498
Calabasas B	41	#0136718
Cold Creek	27	#0071255
	45	#0148768
Del Sur	55	#0138781
Lower Topanga Canyon	19	#0014900
	20	#0017941
	21	#0017942
	22	#0028440
	23	#0017940
Malibou Lake	1	#0046576
	2	#0047197
	3	#0001165
	4	#0039962
	5	#0028487
	6	#0040087
	7	#0012820
	8	#0049496
	10	#0028444
	11	#0071413
	12	#0073653
	13	#0072406
	14	#0071417
	15	#0035727
	16	#0052974
	17	#0093872
	18	#0057971
	25	#0091232
	46	#0137792
Malibu	28	#0070079
Quartz Hill A	38	#0057385
Quartz Hill B	39	#0091087
	40	#0131222
Roosevelt	42	#0137354
Rowland Heights	44	#0138651
Topanga Canyon A	30	#0028394
Topanga Canyon B	34	#0012818
Topanga Canyon C	48	#0111971

TABLE 1-1.
NAMING AND NUMBERING OF LOS ANGELES COUNTY REPETITIVE LOSS PROPERTIES AND AREAS

Repetitive Loss Area Name	Los Angeles County RL Map Number	FEMA RL #
Topanga Canyon D	49	#0137970
Topanga Canyon E	50	#0138321
Triunfo Canyon A	24	#0095737
Triunfo Canyon B	43	#0137793
Upper Topanga Canyon	29	#0074656
	31	#0074334
	32	#0074553
	33	#0076269
	47	#0074498
Mitigated	9	#0014896
	52	#0017933
	53	#0028337
	54	#0049465

CHAPTER 2.
REPETITIVE LOSS AREA ANALYSIS METHODOLOGY

2.1 BASIC REQUIREMENTS

There are two key sets of requirements to be met for a repetitive loss area analysis (RLAA):

- **Repetitive loss area mapping** requirements contained in Section 503 of the CRS Coordinator's Manual and in the supplemental publication, *Mapping Repetitive Loss Areas*. (The supplemental publication was being updated at the time this RLAA was being developed and therefore was not available to provide direction to this process.)
- **Building data collection** requirements contained in Section 512.b of the CRS Coordinator's Manual:
  - Visit each building in the repetitive loss area and collect basic data.
  - Collect data during the site visit that is sufficient to make a preliminary determination of the cause of the repetitive flooding and of mitigation measures that would be appropriate to address the problem. This usually includes a review of drainage patterns around the building, the condition of the structure, and the condition and type of foundation.
  - The person conducting the visit should not have to enter the property—adequate information should be collected from observations from the street.
  - Floor elevations or historical flood levels are not required, but can be helpful if available.
  - The date of each building's insurance claim can help identify the cause of flooding (e.g., rainfall or overbank flooding). The amount of the claim can help determine the amount of damage. Every year, each repetitive loss community is provided with a list of its historical insurance claims. This includes single-claim properties. Non-repetitive-loss communities that elect to do an RLAA may request these data from the CRS program.
  - This step may be done using the "limited data view" of the National Flood Mitigation Data Collection Tool.

More information on building data can be found in *Selecting Appropriate Mitigation Measures for Floodprone Structures* (FEMA-551).

2.2 REVERSE DAMAGE FUNCTION METHODOLOGY (INITIAL IDENTIFICATION)

2.2.1 Rationale for Alternative Approach

For the Los Angeles County RLAA, building data collection requirements were met using an alternative to the approach outlined in the CRS Coordinator's Manual. The RLAA planning team selected the alternative approach—a "reverse damage function" methodology—for initial identification of repetitive loss areas for the following reasons:

- Like many CRS communities, Los Angeles County had not received a formal update of its repetitive loss data from the Insurance Services Office (ISO) since 2011. The County requested updated data from the State of California Department of Water Resources and from FEMA Region IX. Neither agency provided data matching or approximately matching the last set of data provided by ISO in 2011. It was decided to use the 2011 ISO data since it was the most complete and was the last official CRS dataset available to the County.

- Los Angeles County had prepared two detailed floodplain management plans for repetitive loss areas in 2007 that were updated in 2009. Both of these plans were the County's CRS plan of record, meeting the County's Category C repetitive loss requirements. The repetitive loss properties addressed by these plans were identical to those listed by ISO in 2011. These plans included site visits of each property in the identified repetitive loss areas. It was determined that this data could be carried over to this RLAA by being reviewed and enhanced using the selected alternative approach.
- A Level 2, user-defined flood model using Hazus-MH, version 2.1 was constructed in 2015 to support the development of the *Los Angeles County Comprehensive Floodplain Management Plan*. The model was possible due to the quality of Los Angeles County Assessor data available to the planning team. The County Assessor data provided key building attributes to model flood risk, such as date of construction, foundation type, occupancy class, square footage and permit history. The detailed model data allowed the use of the selected alternative approach.

2.2.2 Description of Selected Approach

The selected reverse damage function approach used available data and capabilities to prepare the RLAA. The alternative approach achieves the same objectives as the approach prescribed in the 2013 CRS Coordinator's Manual (Section 512b), while providing the County a better protocol for maintaining data in the future to identify properties in a defined repetitive loss area and determine the cause of repetitive flooding.

The reverse damage function approach is a quantitative process based on modeling principles rather than the qualitative process outlined in the 2013 CRS Coordinator's Manual. It uses an existing model to apply the principles of the "depth-damage function," which is the cornerstone of risk assessment in FEMA's Hazus-MH and Benefit-Cost Analysis programs. Both of these programs estimate damage using curves that show the percentage of asset value that will be damaged as a function of the depth of floodwaters. These depth-damage curves are well-established as a basis for estimating losses caused by flooding.

The reverse damage function methodology uses known values of damage from a flood event, based on filed claims, to estimate what the floodwater depth was for that event. The following protocol was followed:

- Each repetitive loss property from the ISO 2011 data set was mapped in GIS to look for possible groupings based on proximity. The GIS mapping was based on the LiDAR-generated digital elevation model used to prepare the *2015 Los Angeles County Comprehensive Floodplain Management Plan*. This digital elevation model has a 5-foot resolution.
- The average loss for each repetitive-loss (RL) property was determined by taking the average of all claims for that property.
- Replacement cost for each structure was calculated by applying the size and construction class for each RL property to the construction-cost-per-square-foot tables in *2015 BNi Home Builder's Costbook* (Building News International, 2015).
- The percent damage "X" was calculated as:
  - $X = Z \div Y$
  - where:
  - X is the percent damage (to be determined)
  - Y is the replacement cost of the structure (based on assessor information)
  - Z is the estimated loss (based on the flood insurance claim)

- Once the percent damage was determined, the corresponding flood depth was determined by looking at the U.S. Army Corps of Engineers 2003 *Generic Depth-Damage Relationships for Residential Structures* (see Appendix A). These are the same damage functions contained in FEMA's Hazus-MH and BCAR platforms. They represent projected flood depths above the top of the finished floor.
- The determined flood depth was applied to the repetitive loss structure. Using the foundation type from assessor's data, the depth was added to the top of the finished floor. For a structure with a slab foundation, the top of the finished floor was set at 8 inches above adjacent grade. For a structure with a crawlspace foundation, the finished floor was set at 24 inches above adjacent grade. These parameters are based on standard building practices. None of the RL properties were shown to have basements, according the assessor's data.
- Once the depth was applied to the finished floor, it was extended across the digital elevation model until it ran to zero depth (high ground) and a boundary was delineated. These boundaries were projected north, south, east and west for each property. In areas with multiple RL properties, the property with the highest depth above finished floor was used for this exercise.
- The boundary for each repetitive loss area was intersected with an ortho-photo and parcel boundary map. Each parcel with a structure within the delineated boundary was determined to be a property potentially subjected to repetitive flooding and was added to a repetitive loss list for Los Angeles County.
- Once all repetitive loss areas were delineated, they were checked against the repetitive loss areas identified in the 2009 plans.
- The historical claims data base provided to the County by ISO in 2011 for repetitive loss requirements of the CRS program was used to identify properties that had filed single flood insurance claims in each delineated area.
- Property condition assessments were made using the Google Street View application.

Utilizing this methodology, 22 repetitive loss areas were delineated. Maps and descriptions of the causes of flooding for each area can be found in Chapters 7 to 28.

The final step was to determine the cause of flooding, giving consideration to the following findings from the initial identification:

- 24 of 50 properties (48 percent) are located in a FEMA-designated 100-year flood zone.
- 2 of 50 properties (4 percent) are located in a FEMA-designated 500-year flood zone.
- The average number of claims per property was 3.
- The average claim paid, adjusted to 2015 dollars, was $17,109. The highest average claim per property was $52,557 and the lowest was $6,203.
- The average replacement cost for the RL properties was $514,690.
- The average percent-damage (the average claim divided by the replacement cost) was 4.2 percent.
- This correlated to an average flood depth of less than 1 foot above adjacent grade.

The planning team concluded that the majority of the repetitive losses are associated with localized urban drainage flood problems, even for properties within a FEMA-designated flood zone. There is no record of costly loss events that would indicate the maximum flood risk reflected in FEMA mapping. These findings were validated by the conclusions of the 2009 plans.

2.3 SECONDARY IDENTIFICATION

Once the initial identification of the repetitive loss areas was completed using the reverse-damage-function methodology, the planning team performed a secondary review of each repetitive loss area based on three questions about each area:

- Is there really a repetitive loss problem in this area, based on local knowledge?
- Does the list of properties make sense based on what we know about the area?
- Does the county have any additional qualifying data on the area to justify adding or removing properties?

Adjustments were made after applying these questions to each repetitive loss area. The initial identification for the RLAA indicated 164 properties in repetitive-loss areas, with 186 insurable structures. Based on the secondary identification, the list was adjusted to 192 properties with 208 insurable structures. This became the final repetitive loss area mailing list for the unincorporated areas of Los Angeles County.

2.4 PROPERTY CONDITION ASSESSMENT

A subjective assessment for each property in the repetitive loss areas was assigned by the planning team using assessor's data and visual confirmation based on Google Street View where possible. Three categories of property conditions were defined:

- **Good** (optional minor repair)—Only cosmetic repairs are needed.
- **Fair** (needs minor repair)—The following characteristics are observed:
  - Minor shrinkage cracks due to thermal expansion and contraction
  - Signs of rust on iron or steel members
  - Signs of corrosion of rebar
- P**oor** (needs significant repair)—The following types of damage are observed:
  - Bowed brick veneer wall or parapet walls
  - Leaning of wall
  - Wall cracking due to excessive settlement
  - Building settlement
  - Large cracking around sills, eaves, chimneys, parapets, and iron or steel lintels
  - Differential settlement of chimney
  - Fungal and insect attack of wood
  - Exposed rebar in concrete walls due to corrosion
  - Fire damage.

2.5 FOUNDATION TYPE

In Los Angeles County, there are generally two types of foundations (see Figure 2-1):

- A crawlspace, or raised foundation, is built above the ground, with just enough room to crawl underneath. There are stem walls on the perimeters, pierced in-between, with a girder system and floor joists on top of that. The foundation is high enough to leave at least 2 feet below to crawl into for access to the home's mechanical systems.
- Slab foundation is usually concrete poured directly onto the ground. This type of foundation uses concrete rather than wood to help support the weight of the home.

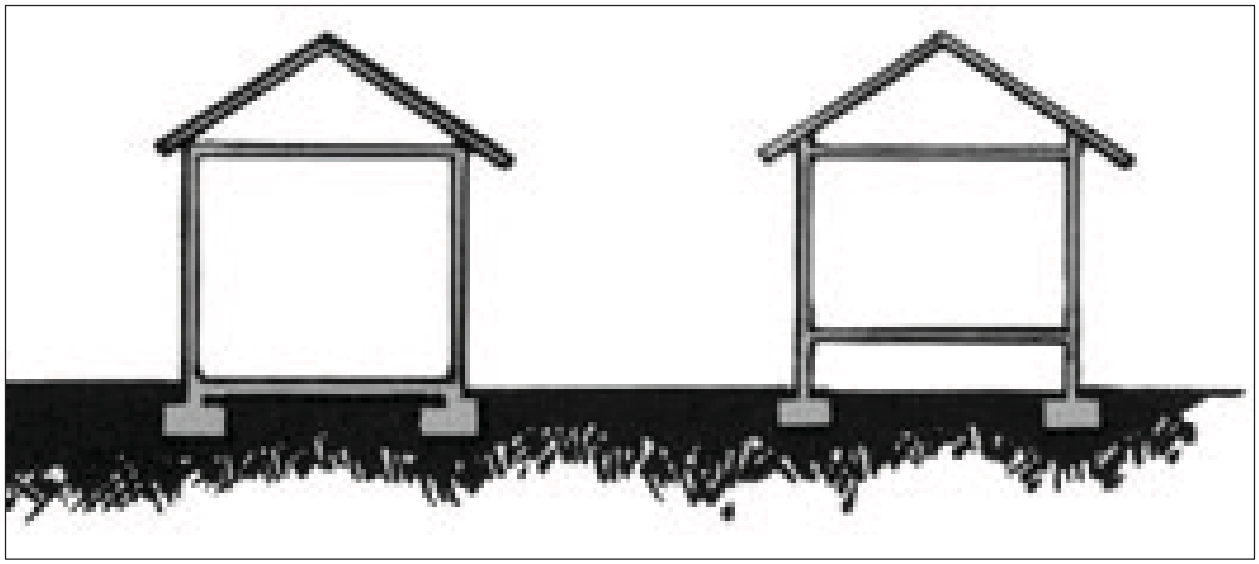


Figure 2-1. Foundation Types—Slab (left) and Crawlspace (right)

CHAPTER 3.
REPETITIVE LOSS AREAS OUTREACH

3.1 CRS OUTREACH REQUIREMENTS FOR RLAA

RLAA Step 1 (2013 CRS Coordinator's Manual Section 512.b) requires notification that an analysis is being conducted to all properties in the repetitive loss areas, with a request for input on the hazard and recommended actions. The notice (or any public document) must not identify which properties are on FEMA's repetitive loss list. There are no restrictions on publicizing what properties are in repetitive loss areas that have more than one property and there are no restrictions on publishing aggregate data, such as how many properties received claims or the average value of those claims. Planning staff may share insurance claim information with the owner of a property but may not make it available to anyone else.

- The notice can be sent to owners OR residents, at the community's discretion, as long as a representative of each property is notified.
- The notice cannot be done via a newspaper or newsletter notice or article.
- The notice must advise the recipients when and how copies of the draft report can be obtained and ask for their comments on the draft.

Several methods were deployed to engage repetitive loss area property owners during the course of this RLAA process. This chapter highlights those efforts.

RLAA Step 2 requires contact with agencies or organizations that may have plans or studies that could affect the cause or impacts of the flooding. The analysis report must identify contacted agencies and organizations.

3.2 COUNTYWIDE FLOODPLAIN MANAGEMENT PLANNING EFFORT

This Repetitive Loss Area Analysis is considered by Los Angeles County Department of Public Works to be the companion document to the 2016 Los Angeles County Comprehensive Floodplain Management Plan. The two plans were created in concert, with oversight by the same planning team. The development of this RLAA benefited from the planning process conducted to develop the floodplain management plan. The outreach effort used to develop the floodplain management plan included properties in the repetitive loss areas and provided a tangible benefit to the RLAA effort. This section provides an overview of the outreach conducted for the floodplain management plan.

3.2.1 Contact with Agencies and Organizations

The following agencies were invited to participate in the planning process from the beginning and were kept apprised of plan development milestones:

- California State Department of Water Resources
- California State Office of Emergency Services
- City of Agoura Hills
- City of Arcadia
- City of Calabasas

- City of Glendale
- City of Glendora
- City of La Canada Flintridge
- City of La Verne
- City of Lancaster
- City of Los Angeles
- City of Monrovia
- City of Palmdale
- City of San Dimas
- City of Santa Clarita
- City of Sierra Madre
- City of Westlake Village
- FEMA Region IX
- Kern County
- Orange County
- San Bernardino County
- Ventura County

These agencies received meeting announcements, meeting agendas, and meeting minutes by email throughout the RLAA development process. In addition, the RLAA was submitted for review to the Los Angeles County Access and Functional Needs Committee, in order to ensure compliance with the federal Americans with Disabilities Act.

3.2.2 Strategy

The strategy for involving the public in developing the RLAA emphasized the following elements:

- Include members of the public on the Steering Committee.
- Attempt to reach as many citizens as possible using multiple media.
- Use a survey to determine public perception of flood risk and support of mitigation actions.
- Identify and involve stakeholders
- Develop a Program for Public Information.
- Conduct public meetings to invite the public's input.

Stakeholders and the Steering Committee

Stakeholders are the individuals, agencies and jurisdictions that have a vested interest in the recommendations of the RLAA. The effort to include stakeholders in this process included stakeholder participation on the Steering Committee. Stakeholders targeted for this process included:

- Community representatives

- Los Angeles County departments responsible for activities relevant to floodplain management
- Environmental advocacy groups
- Local disaster preparedness and response agencies
- Owners and operators of businesses within the floodplain
- Repetitive loss area representatives.

CRS Step 2 awards credit for a planning process conducted through a committee that includes members of the public and/or non-governmental stakeholders. The 13-member Steering Committee includes six non-governmental stakeholders (46.2 percent).

Website

At the beginning of the development of the current plan, a floodplain management plan section was developed on Los Angeles County's website to keep the public informed about planning activities and to solicit input (see Figure 3-1). The site's address (http://dpw.lacounty.gov/WMD/NFIP/FMP/) was publicized in all press releases, mailings and public meetings. The site provided the public with information on the plan development process, the Steering Committee, a project survey, and drafts of the plan. Los Angeles County will keep the website active after the plan's completion to keep the public informed about mitigation projects and future plan updates.

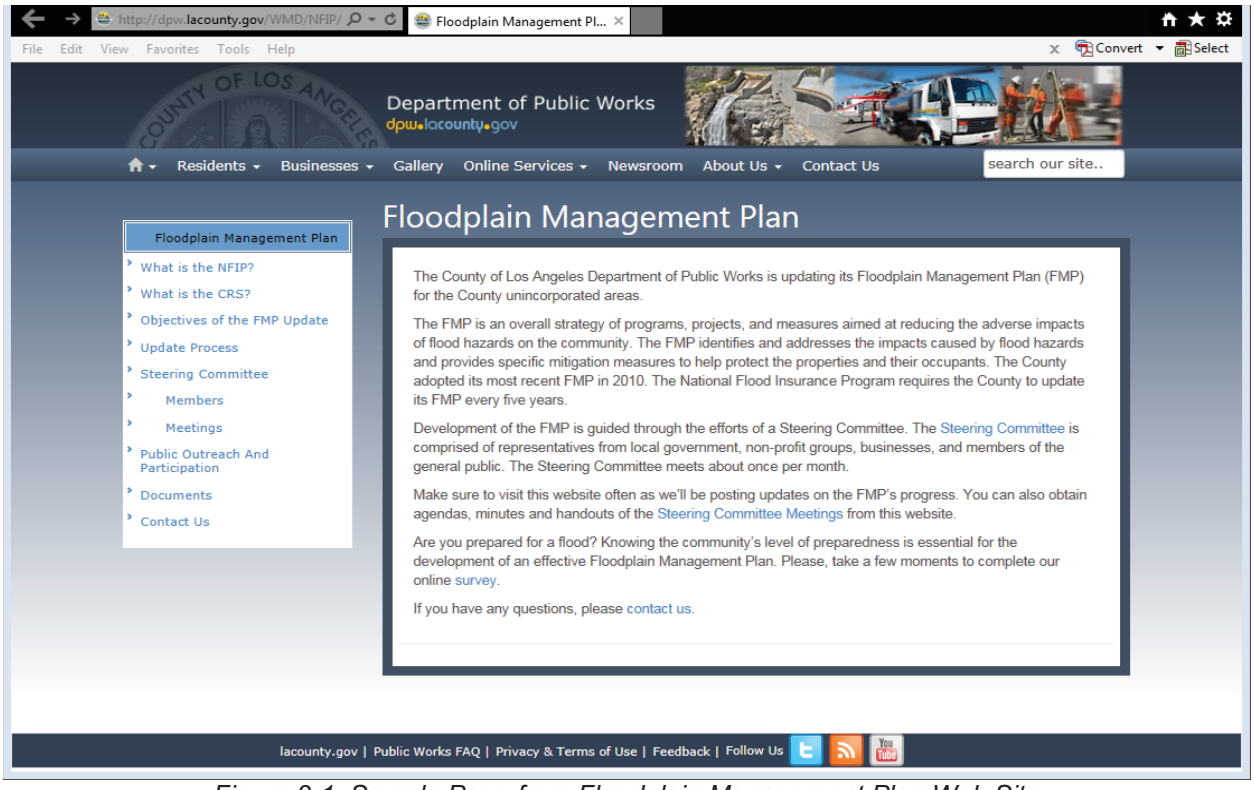
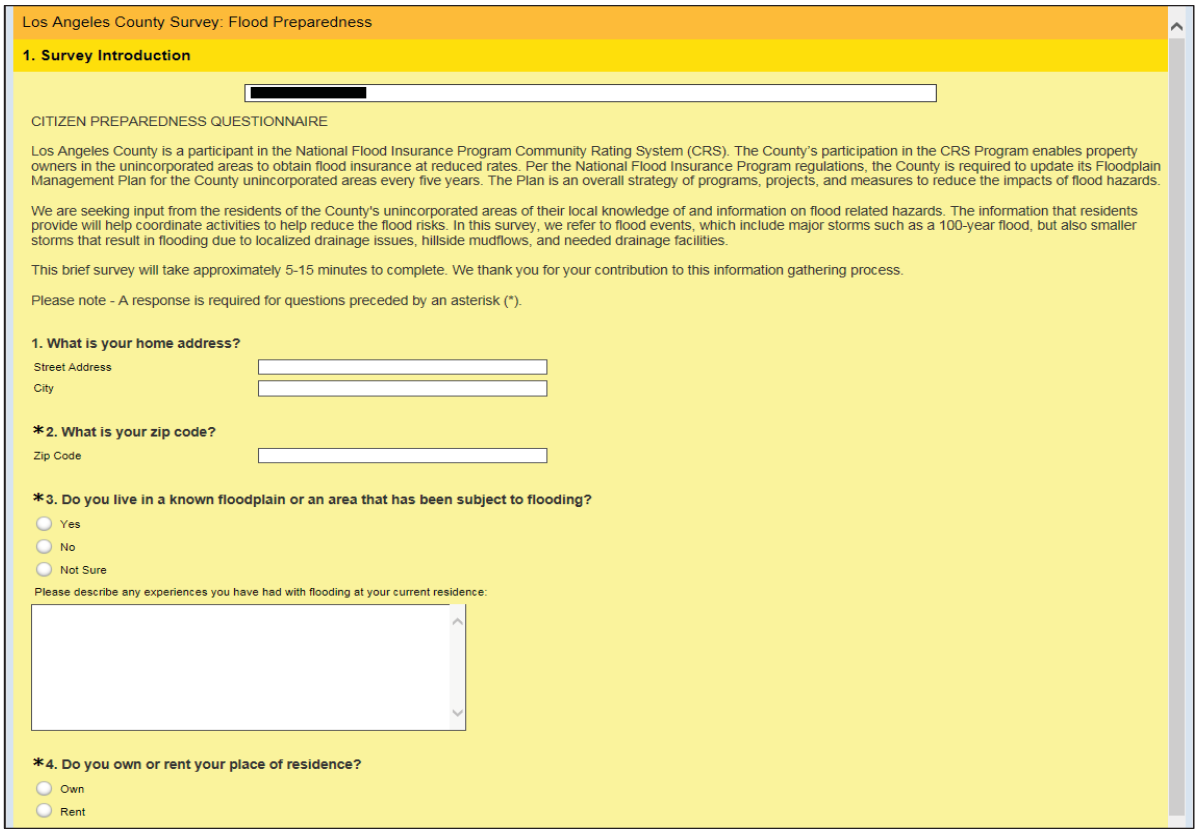


Figure 3-1. Sample Page from Floodplain Management Plan Web Site

Survey

A survey (see Figure 3-2) was developed by the planning team with guidance from the Steering Committee. The survey was used to gauge household preparedness for the flood hazard and the level of knowledge of tools and techniques that assist in reducing risk and loss from flooding. This survey was designed to help

identify areas vulnerable to floods. The answers to its 33 questions helped guide the Steering Committee in affirming the goals and objectives identified during the planning process and in selecting repetitive loss area action items.


Los Angeles County Survey: Flood Preparedness

1. Survey Introduction

CITIZEN PREPAREDNESS QUESTIONNAIRE

Los Angeles County is a participant in the National Flood Insurance Program Community Rating System (CRS). The County's participation in the CRS Program enables property owners in the unincorporated areas to obtain flood insurance at reduced rates. Per the National Flood Insurance Program regulations, the County is required to update its Floodplain Management Plan for the County unincorporated areas every five years. The Plan is an overall strategy of programs, projects, and measures to reduce the impacts of flood hazards.

We are seeking input from the residents of the County's unincorporated areas of their local knowledge of and information on flood related hazards. The information that residents provide will help coordinate activities to help reduce the flood risks. In this survey, we refer to flood events, which include major storms such as a 100-year flood, but also smaller storms that result in flooding due to localized drainage issues, hillside mudflows, and needed drainage facilities.

This brief survey will take approximately 5-15 minutes to complete. We thank you for your contribution to this information gathering process.

Please note - A response is required for questions preceded by an asterisk (*).

1. What is your home address?

Street Address

City

***2. What is your zip code?**

Zip Code

***3. Do you live in a known floodplain or an area that has been subject to flooding?**

Yes
No
Not Sure

Please describe any experiences you have had with flooding at your current residence:

***4. Do you own or rent your place of residence?**

Own
Rent

Figure 3-2. Sample Page from Survey Distributed to the Public

Multiple methods were used to solicit survey responses:

- A web-based version of the survey was made available on the plan website.
- Mailings to residents notifying them of public meetings included links to the online survey.
- All attendees at the public open houses were asked to complete a survey, using the web site or hard copies of the survey form available at the open houses.
- A flyer was prepared advertising the survey.
- Individual Steering Committee members contacted organizations to request that they publicize the link to the online survey; the following outlets were contacted in this way:
  - Los Angeles Chamber of Commerce weekly newsletter
  - Neighborhood Watch email lists
- The Los Angeles County Department of Public Works advertised the survey on its Twitter account (see Figure 3-3).

Hard copies of the survey were made available at the public open houses. A web-based version was available on the plan website. Although the number of surveys completed (136) is not sufficient to establish statistical trends, the responses provided valuable feedback to use in the planning process. The complete survey and a summary of its findings can be found in Appendix B.

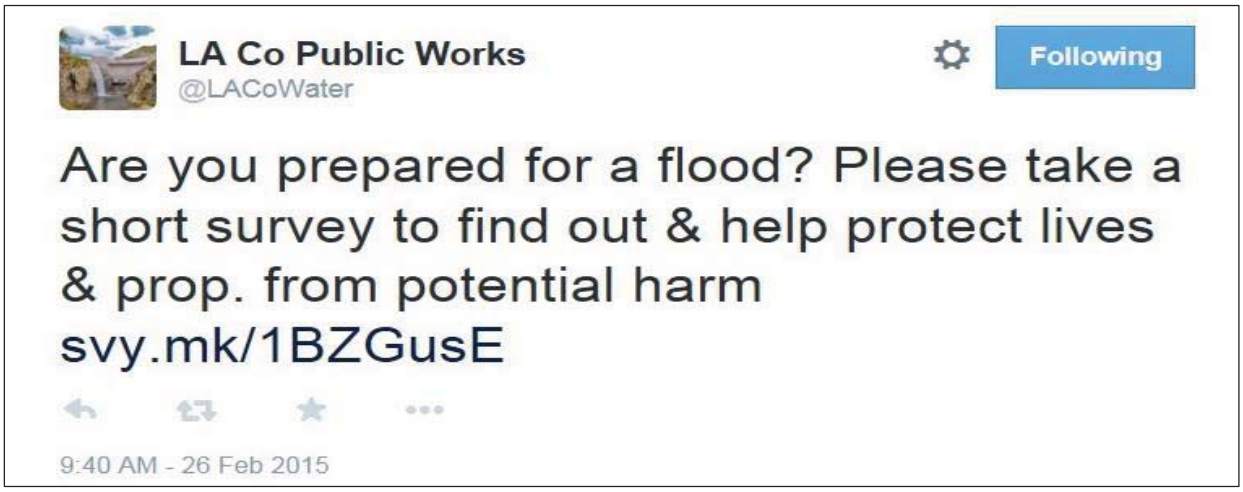


Figure 3-3. Twitter Notification of Survey from Department of Public Works

Open House Public Meetings

Meaningful public participation was essential for the planning process. Public meetings were held to disseminate information and to solicit input from community members, as summarized in Table 3-1.

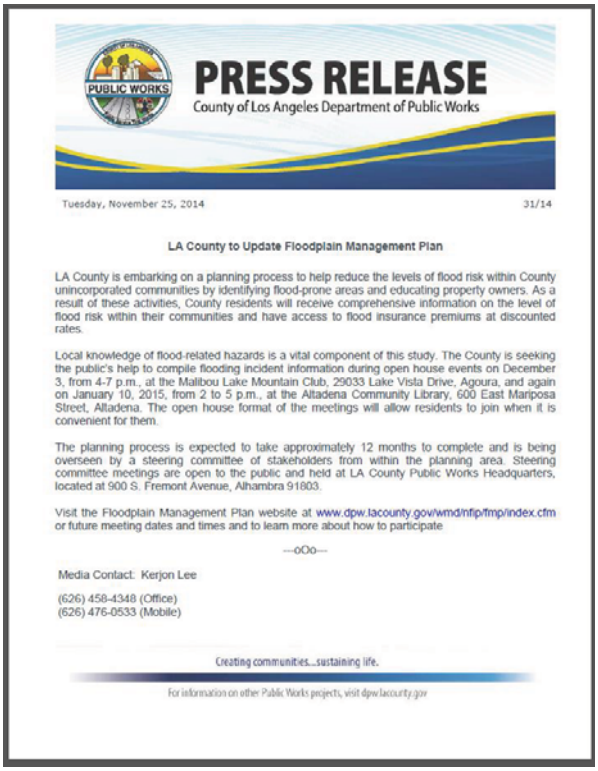
TABLE 3-1.
FLOODPLAIN MANAGEMENT PLAN OPEN HOUSE PUBLIC MEETINGS

When	Where
December 3, 2014, 4:00 pm to 7:00 pm	Agoura: Malibou Lake Mountain Club 29033 Lake Vista Drive, Agoura, CA 91301
January 10, 2015, 2:00 pm to 5:00 pm	Altadena: Altadena Community Library 600 East Mariposa Street, Altadena, CA 91001
January 24, 2015, 11:00 am to 2:00 pm	Santa Clarita: Canyon Country Jo Anne Darcy Library 18601 Soledad Canyon Road, Santa Clarita, CA 91351
February 21, 2015, 12:00 pm to 3:00 pm	Lancaster: Lancaster Public Library 601 West Lancaster Boulevard, Lancaster, CA 93534
April 2, 2015, 5:00 pm to 7:00 pm	Lynwood: Lynwood Library 11320 Bullis Road, Lynwood, CA 90262

Open House Meeting Notification

Multiple means were used to provide broad public notice of the open house public meetings:

- Notice of all public meetings was posted on the project website.
- Press releases were distributed to the media announcing meeting times and locations (see Figure 3-4)
- Flyers were developed and distributed throughout the communities (see Figure 3-5).
- Postcards were mailed to properties located in floodplains near the meeting locations (see Figure 3-6). Over the course of the planning process, 2,472 postcards were distributed.



PRESS RELEASE

County of Los Angeles Department of Public Works

Tuesday, November 25, 2014 31/14

LA County to Update Floodplain Management Plan

LA County is embarking on a planning process to help reduce the levels of flood risk within County unincorporated communities by identifying flood-prone areas and educating property owners. As a result of these activities, County residents will receive comprehensive information on the level of flood risk within their communities and have access to flood insurance premiums at discounted rates.

Local knowledge of flood-related hazards is a vital component of this study. The County is seeking the public's help to compile flooding incident information during open house events on December 3, from 4-7 p.m., at the Malibou Lake Mountain Club, 29033 Lake Vista Drive, Agoura, and again on January 10, 2015, from 2 to 5 p.m., at the Altadena Community Library, 600 East Mariposa Street, Altadena. The open house format of the meetings will allow residents to join when it is convenient for them.

The planning process is expected to take approximately 12 months to complete and is being overseen by a steering committee of stakeholders from within the planning area. Steering committee meetings are open to the public and held at LA County Public Works Headquarters, located at 900 S. Fremont Avenue, Alhambra 91803.

Visit the Floodplain Management Plan website at www.dpw.lacounty.gov/wmd/nfip/fmp/index.cfm or future meeting dates and times and to learn more about how to participate

---oOo---

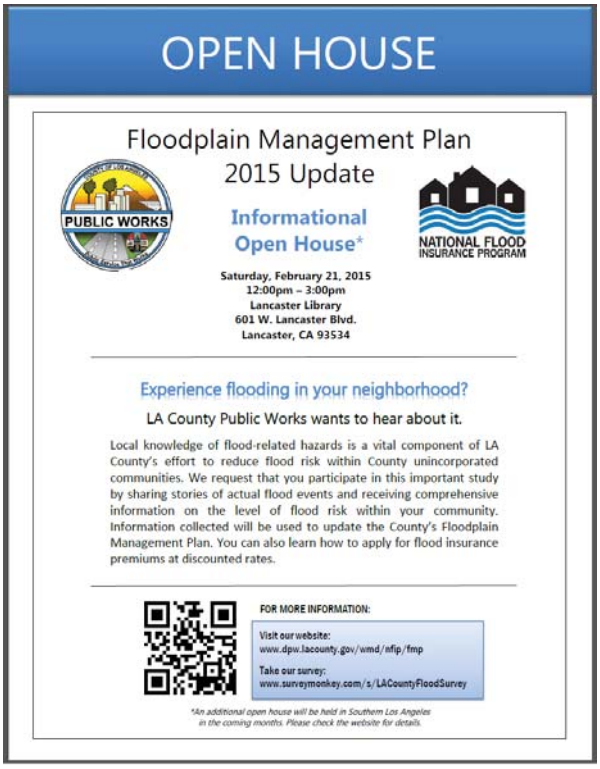
Media Contact: Kerjon Lee

(626) 458-4348 (Office)
(626) 476-0533 (Mobile)

Creating communities...sustaining life.

For information on other Public Works projects, visit dpw.lacounty.gov

Figure 3-4. Press Release Announcing Public Meetings for the Floodplain Management Plan



OPEN HOUSE

Floodplain Management Plan
2015 Update

Informational
Open House*

NATIONAL FLOOD INSURANCE PROGRAM

Saturday, February 21, 2015
12:00pm – 3:00pm
Lancaster Library
601 W. Lancaster Blvd.
Lancaster, CA 93534

Experience flooding in your neighborhood?

LA County Public Works wants to hear about it.

Local knowledge of flood-related hazards is a vital component of LA County's effort to reduce flood risk within County unincorporated communities. We request that you participate in this important study by sharing stories of actual flood events and receiving comprehensive information on the level of flood risk within your community. Information collected will be used to update the County's Floodplain Management Plan. You can also learn how to apply for flood insurance premiums at discounted rates.

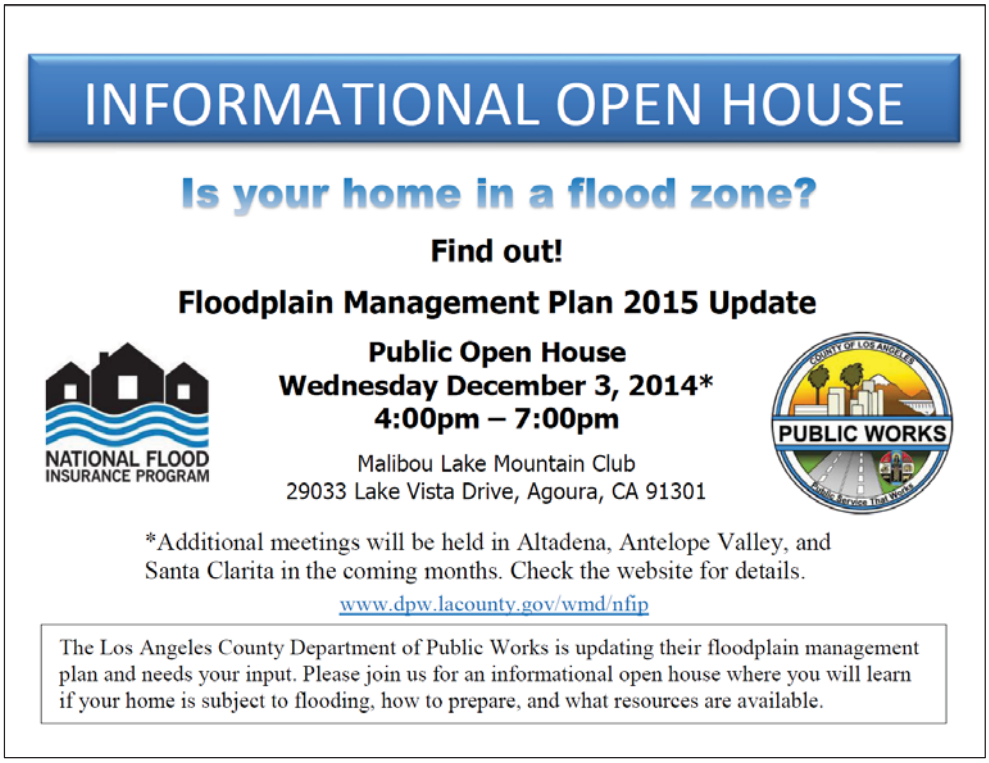
FOR MORE INFORMATION:

Visit our website:
www.dpw.lacounty.gov/wmd/nfip/fmp

Take our survey:
www.surveymonkey.com/s/LACountyFloodSurvey

*An additional open house will be held in Southern Los Angeles in the coming months. Please check the website for details.

Figure 3-5. Flyer Announcing Public Meeting for the Floodplain Management Plan



INFORMATIONAL OPEN HOUSE

Is your home in a flood zone?

Find out!

Floodplain Management Plan 2015 Update

NATIONAL FLOOD INSURANCE PROGRAM

Public Open House
Wednesday December 3, 2014*
4:00pm – 7:00pm

Malibou Lake Mountain Club
29033 Lake Vista Drive, Agoura, CA 91301

PUBLIC WORKS

*Additional meetings will be held in Altadena, Antelope Valley, and Santa Clarita in the coming months. Check the website for details.

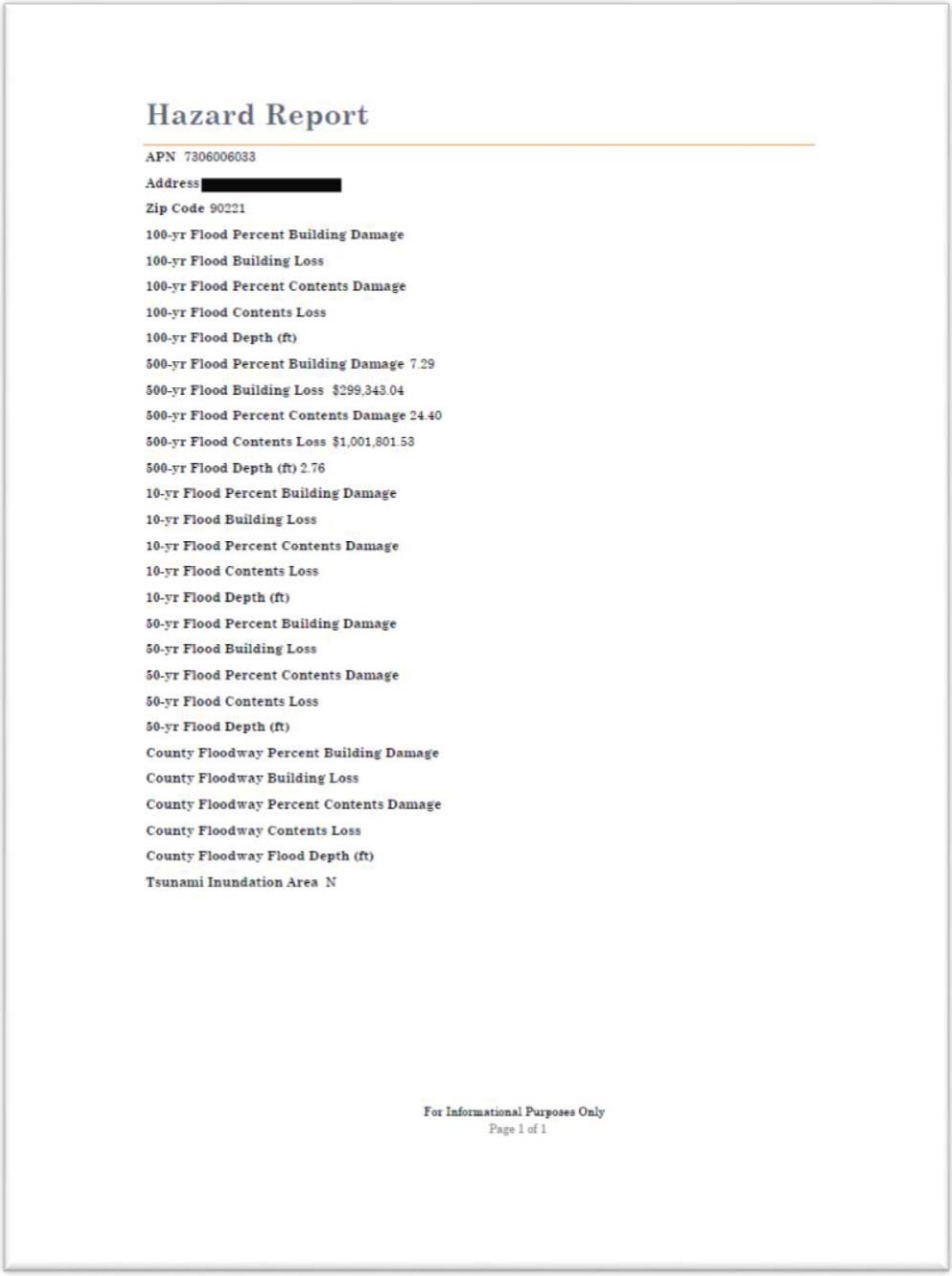
www.dpw.lacounty.gov/wmd/nfip

The Los Angeles County Department of Public Works is updating their floodplain management plan and needs your input. Please join us for an informational open house where you will learn if your home is subject to flooding, how to prepare, and what resources are available.

Figure 3-6. Postcard Announcing Public Meeting for the Floodplain Management Plan

Open House Meeting Format

The public meeting format allowed attendees to examine maps and handouts and have direct conversations with project staff. Reasons for planning and information generated for the risk assessment were shared with attendees via a PowerPoint presentation. Computer mapping workstations loaded with output from the Hazus modeling allowed citizens to see information on their property, including exposure and damage estimates for flood hazard events (see Figure 3-7). Participating property owners were provided printouts of this information for their properties. This tool was effective in illustrating risk to the public. Planning team members were present to answer questions. Each citizen attending the open houses was asked to complete a survey, and each was given an opportunity to provide written comments to the Steering Committee. Example meeting activities are shown in Figure 3-8 through Figure 3-11.



Hazard Report

APN 7306006033

Address [redacted]

Zip Code 90221

100-yr Flood Percent Building Damage

100-yr Flood Building Loss

100-yr Flood Percent Contents Damage

100-yr Flood Contents Loss

100-yr Flood Depth (ft)

500-yr Flood Percent Building Damage 7.29

500-yr Flood Building Loss $299,343.04

500-yr Flood Percent Contents Damage 24.40

500-yr Flood Contents Loss $1,001,801.53

500-yr Flood Depth (ft) 2.76

10-yr Flood Percent Building Damage

10-yr Flood Building Loss

10-yr Flood Percent Contents Damage

10-yr Flood Contents Loss

10-yr Flood Depth (ft)

50-yr Flood Percent Building Damage

50-yr Flood Building Loss

50-yr Flood Percent Contents Damage

50-yr Flood Contents Loss

50-yr Flood Depth (ft)

County Floodway Percent Building Damage

County Floodway Building Loss

County Floodway Percent Contents Damage

County Floodway Contents Loss

County Floodway Flood Depth (ft)

Tsunami Inundation Area N

For Informational Purposes Only

Page 1 of 1

Figure 3-7. Example Printout from Hazus Workstation

Figure 3-8. Hazus Workstation, Malibou Lake Mountain Club Meeting, December 3, 2014

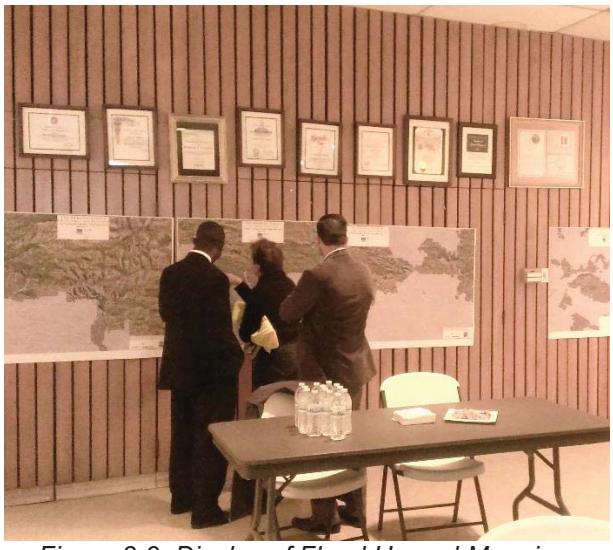


Figure 3-9. Display of Flood Hazard Mapping, Altadena Meeting, January 10, 2015

Figure 3-10. Informational Presentation, Santa Clarita Meeting, January 24, 2015

Figure 3-11. Team Member Discussion with a Resident, Santa Clarita Meeting, January 24, 2015

Presentations to Town Councils

In addition to the public meetings described above, several town councils asked to be briefed on the floodplain management planning process. Table 3-2 lists the presentations to town councils. Town councils in Los Angeles County are advisory boards made up of elected representatives from unincorporated local communities. They are a voice of the community, conveying the needs of its residents to County, state and federal agencies.

TABLE 3-2.
FLOODPLAIN MANAGEMENT PLAN PRESENTATIONS TO TOWN COUNCILS

When	Where
March 18, 2015, 6:00 pm	Lancaster—Antelope Acres Town Council Meeting: Westside Community Church 47707 90th Street West, Lancaster, CA 93536
March 24, 2015, 7:00 pm	Palmdale— Lake Los Angeles Town Council Meeting: Stephen Sorensen Park Gymnasium 16801 East Avenue P, Lake Los Angeles, CA 93591
March 25, 2015, 7:00 pm	Lancaster— Association of Rural Town Councils Meeting: Fire Station 129 42110 N. 6th Street West, Lancaster, CA 93534

3.2.3 Public Involvement Results

Survey Outreach

The survey for was completed by 136 respondents. Detailed results are provided in Appendix B. Key results are as follows:

- Over 20 percent of respondents believe they live in a floodplain or area subject to flooding.
- Of all respondents whose addresses could be geo-located for confirmation, 10.8 percent live in a known floodplain.
- 14.9 percent of respondents confirmed that they have flood insurance, 69.4 percent responded that they do not have flood insurance, and 15.7 percent were not sure.
- Most respondents without flood insurance said that they do not have it because they do not need it, as their property has never flooded (41.9 percent) or because their property is at higher elevation (30.1 percent).
- 25 percent of respondents definitively located in the floodplain (two total) said that the presence of a flood hazard at their current home was not disclosed to them by a real estate agent, seller, or landlord. 58.6 percent of all respondents believe such disclosure would influence their decision to buy or rent a home; 20.7 percent were not sure.
- Some residents requested examination of their flood zone risk, stating that they are in an identified flood zone but do not believe themselves to be at risk (either due to property elevation or lack of direct flood experience).
- The flood hazards identified as issues of concern to the most respondents include urban flooding/drainage issues, climate change impacts, and mudflow hazards.
- 10.4 percent of respondents felt either well prepared or very well prepared for a flood event; 40.6 percent indicated feeling somewhat prepared.
- 41.4 percent of residents disagreed or strongly disagreed that flood hazard and risk information is easy to find.
- The most frequently identified sources for previously received flood awareness information were federal, state, and local emergency management (45.6 percent), local news or media (29.8 percent), and personal experience (20.2 percent).
- Respondents' top preferred methods for receiving public education are as follows:

  - Internet (52.1 percent)
  - TV news (47.9 percent)
  - Radio news (43.8 percent)
  - Public awareness campaign, e.g., flood awareness week (32.2 percent)
  - Social media, such as Twitter or Facebook (32.2 percent).
- Respondents' top preferred methods for receiving emergency notifications are as follows:
  - Text message (58.7 percent)
  - Cell phones (44.6 percent)
  - Email (42.1 percent).
- 70.4 percent of respondents agree or strongly agree that local, state and federal government should provide programs promoting citizen action to reduce exposure to flood risks.
- Respondents ranked government-sponsored flood damage reduction projects in the following order of preference.
  - Retrofitting infrastructure (improving culverts, bridges, and local drainage)
  - Capital projects (dams, levees, floodwalls, and drainage improvements)
  - Providing better flood risk information to the public
  - Strengthening codes and regulations to higher regulatory standards
  - Acquiring vulnerable properties and maintaining them as open space
  - Assisting vulnerable property owners with securing mitigation funding
  - Other measures
- 81 percent of respondents support the preservation of natural land containing a flood hazard.

Open House Public Meetings and Town Council Presentations

The concept of mitigation was introduced to the public at public meetings. These gave the Steering Committee and planning team feedback that was used in developing components of the plan. Meeting results are summarized in Table 3-3. The following is a summary of comments received from attendees at the meetings and presentations:

- Concerns were expressed regarding the crossings of washes in the Antelope Valley, where streams flow across roads during storms, preventing cars from passing. On some occasions, vehicles have been swept away. A town council member indicated that there was at least one death when someone tried to cross a wash with too much flow. The town council member specifically identified Avenue O as a problem, where Big Rock Wash splits into two washes. During big storms, residents between the two washes are confined until floodwaters recede. This can also be a problem if emergency vehicles need to access the homes.
- Residents expressed concern about Lake Los Angeles flooding. On Avenue P-8, sediment has partially filled in a natural watercourse that runs through private properties. Some property owners also placed fences across the watercourse. During a storm several years ago, water overflowed the watercourse and flooded several neighboring homes. One resident indicated that several feet of mud on her property resulted in the loss of a horse.
- One resident noted that a repaving of Spunky Canyon Road was resulting in drainage issues.
- One resident was a Realtor hoping to find a resource for sharing flood information with potential buyers.
- Three attendees who reside in a FEMA-designated Zone AH area east of I-605 between Rivera Road and Slauson Avenue expressed concern about required flood insurance costs.

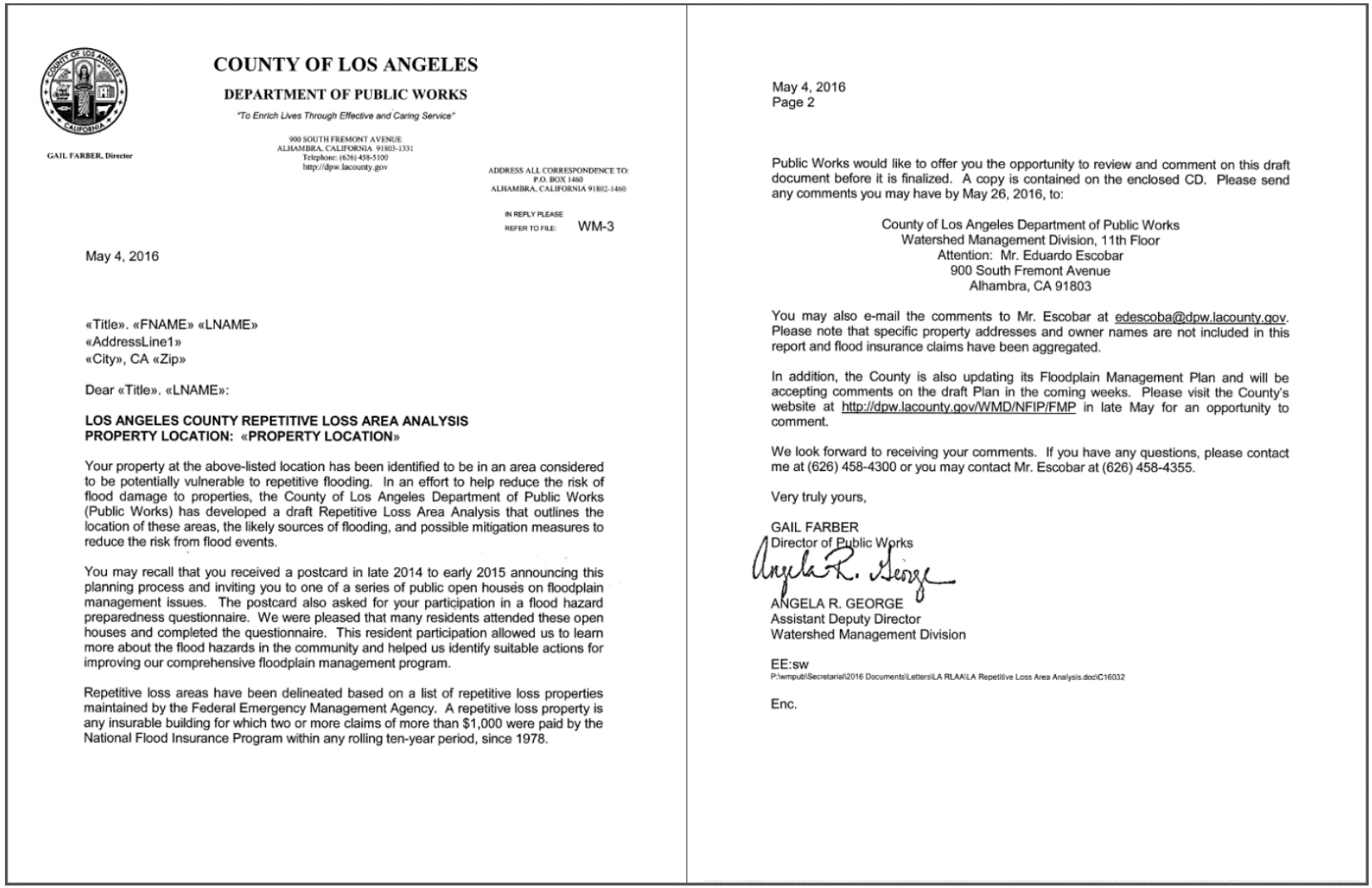
TABLE 3-3.
SUMMARY OF OPEN HOUSE PUBLIC MEETINGS AND TOWN COUNCIL PRESENTATIONS

Date	Location	Number of Attendees	Number of Surveys Received
Open House Public Meetings			
December 3, 2014	Malibou Lake Mountain Club	20	5
January 10, 2015	Altadena Community Library	6	0
January 24, 2015	Canyon Country Jo Anne Darcy Library	8	3
February 21, 2015	Lancaster Public Library	10	2
April 2, 2015	Lynwood Library	4	0
Town Council Presentations			
March 18, 2015	Antelope Acres Town Council Meeting, Westside Community Church	11	0
March 24, 2015	Lake Los Angeles Town Council Meeting, Stephen Sorensen Park Gymnasium	30	0
March 25, 2015	Association of Rural Town Councils Meeting, Fire Station 129	19	0
Total		**108**	**10**

- One resident indicated that she had received a notice requiring an additional payment for flood insurance. She was unable to remember from whom she had received the letter.
- Comments made at the Malibou Lake meeting addressed the following topics:
  - Reevaluation of the FEMA Malibou Lake delineations
  - Sediment issues at Malibou Lake
  - Malibou Lake spillway modifications
  - General concerns about the accuracy of FEMA mapping
  - Management of Westlake Village dam (located upstream of Malibou Lake).
- Various attendees indicated corrections to flood hazard map posters displayed at the meetings, including depth values and creek names.
- A resident who attended the Santa Clarita meeting lives in a FEMA-designated Zone AO area and received information about elevation certificates at the meeting. In a follow-up email, he said that after submitting the elevation certificate to his insurance company his rate was reduced from $1,071 to $331.

3.3 REPETITIVE LOSS AREA SPECIFIC OUTREACH

Upon the completion of a draft of this report, Los Angeles County Department of Public Works disseminated a letter to residents in each repetitive loss area informing them of this report, where and how they would be able to review it, and where and how they might submit comments regarding it. The communication document is shown in Figure 3-12.



COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
http://dpw.lacounty.gov

GAIL FARBER, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE: WM-3

May 4, 2016

«Title». «FNAME» «LNAME»
«AddressLine1»
«City», CA «Zip»

Dear «Title». «LNAME»:

LOS ANGELES COUNTY REPETITIVE LOSS AREA ANALYSIS
PROPERTY LOCATION: «PROPERTY LOCATION»

Your property at the above-listed location has been identified to be in an area considered to be potentially vulnerable to repetitive flooding. In an effort to help reduce the risk of flood damage to properties, the County of Los Angeles Department of Public Works (Public Works) has developed a draft Repetitive Loss Area Analysis that outlines the location of these areas, the likely sources of flooding, and possible mitigation measures to reduce the risk from flood events.

You may recall that you received a postcard in late 2014 to early 2015 announcing this planning process and inviting you to one of a series of public open houses on floodplain management issues. The postcard also asked for your participation in a flood hazard preparedness questionnaire. We were pleased that many residents attended these open houses and completed the questionnaire. This resident participation allowed us to learn more about the flood hazards in the community and helped us identify suitable actions for improving our comprehensive floodplain management program.

Repetitive loss areas have been delineated based on a list of repetitive loss properties maintained by the Federal Emergency Management Agency. A repetitive loss property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program within any rolling ten-year period, since 1978.

May 4, 2016
Page 2

Public Works would like to offer you the opportunity to review and comment on this draft document before it is finalized. A copy is contained on the enclosed CD. Please send any comments you may have by May 26, 2016, to:

County of Los Angeles Department of Public Works
Watershed Management Division, 11th Floor
Attention: Mr. Eduardo Escobar
900 South Fremont Avenue
Alhambra, CA 91803

You may also e-mail the comments to Mr. Escobar at edescoba@dpw.lacounty.gov. Please note that specific property addresses and owner names are not included in this report and flood insurance claims have been aggregated.

In addition, the County is also updating its Floodplain Management Plan and will be accepting comments on the draft Plan in the coming weeks. Please visit the County's website at http://dpw.lacounty.gov/WMD/NFIP/FMP in late May for an opportunity to comment.

We look forward to receiving your comments. If you have any questions, please contact me at (626) 458-4300 or you may contact Mr. Escobar at (626) 458-4355.

Very truly yours,

GAIL FARBER
Director of Public Works

Angela R. George

ANGELA R. GEORGE
Assistant Deputy Director
Watershed Management Division

EE:sw
P:\wmpub\Secretarial\2016 Documents\Letters\LA RLAA\LA Repetitive Loss Area Analysis.doc\C16032

Enc.

Figure 3-12. Repetitive Loss Area Target Mailing

CHAPTER 4.
RELEVANT PROGRAMS AND REGULATIONS

This chapter provides a comprehensive review of existing laws, ordinances and plans at the federal, state and local level that can support or impact action items identified in this RLAA. Federal, state, and local agencies share and coordinate responsibilities for flood protection in Los Angeles County. The two main federal agencies are the U.S. Army Corps of Engineers, which implements federal flood protection policies, and FEMA. The California Department of Water Resources (DWR) is responsible for managing the state's waterways. The Los Angeles County Department of Public Works and the Los Angeles County Flood Control District work to reduce flood risk in Los Angeles County. Development of the RLAA included a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process. Pertinent federal, state and local laws are described below.

4.1 FEDERAL

4.1.1 National Flood Insurance Program

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1-percent annual chance flood (called the 100-year flood or base flood) and the 0.2-percent annual chance flood (the 500-year flood). Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principle tool for identifying the extent and location of the flood hazard. FIRMs are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under their floodplain management program.

Participants in the NFIP must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a flood-prone area, participating jurisdictions must, at a minimum, ensure that the project meets the following criteria (44 CFR Part 60, Section 60.3):

- Be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy,
- Be constructed with materials resistant to flood damage
- Be constructed by methods and practices that minimize flood damage
- Be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

Additional criteria apply depending on the availability of information about the flood hazard.

Los Angeles County participates in the NFIP and has adopted regulations that meet the NFIP requirements. The County entered the NFIP in 1980, and the first Los Angeles County FIRM was issued December 2, 1980. Structures permitted or built before then are called "pre-FIRM" structures, and structures built afterwards are called "post-FIRM." The insurance rate is different for the two types of structures. The

effective date for the current FIRM is September 26, 2008. Los Angeles County is currently in good standing with the provisions of the NFIP.

4.1.2 The Community Rating System

The CRS is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions to meet the CRS goals of reducing flood losses, facilitating accurate insurance rating and promoting awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 9 community would receive a 5 percent premium discount, a Class 8 community would receive a 10 percent premium discount, and so on, until reaching a 45 percent premium discount for a Class 1 community. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) As of May 2014, out of 1,296 communities in the U.S. participating in the CRS program, only 88 were rated Class 5 and only 12 were rated higher (see Figure 4-1).

Source: FEMA, 2014a

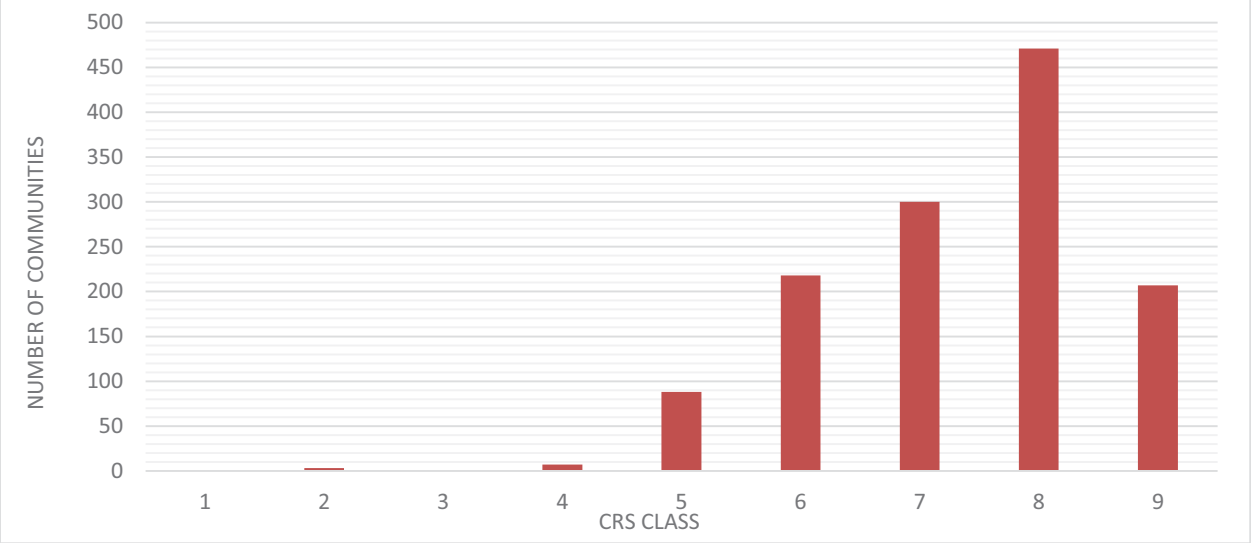


Figure 4-1. CRS Communities by Class Nationwide as of May 2014

The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public information
- Mapping and regulations
- Flood damage reduction
- Flood preparedness.

CRS activities can help to save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk; over 66 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks.

Los Angeles County has participated in the CRS program since 1990. Los Angeles County has a Class 7 rating (out of 10), so citizens who live in a 100-year floodplain in unincorporated areas of the county can receive a 15-percent discount on their flood insurance; outside the 100-year floodplain they receive a 5-percent discount. This equates to a savings ranging from $66 to $475 per policy, for a total countywide premium savings of almost $350,000 (California DWR, 2013). To maintain or improve its rating, the Los Angeles County goes through an annual recertification and a re-verification every five years.

4.1.3 Disaster Mitigation Act of 2000

The federal Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for state, local and Indian tribal governments as a condition of mitigation grant assistance. The DMA replaced previous federal mitigation planning provisions with new requirements that emphasize the need for planning entities to coordinate mitigation planning and implementation efforts. The DMA established a new requirement for local mitigation plans and authorized up to 7 percent of Hazard Mitigation Grant Program funds to be available for development of state, local, and Indian tribal mitigation plans.

4.1.4 Endangered Species Act

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

In some parts of the country, including the Pacific Northwest and the Sacramento-San Joaquin Delta area, court rulings have found that floodplain management measures can conflict with the goals of the endangered species act. Those rulings have required FEMA and local governments to engage in a consultation process with federal wildlife agencies (Section 7 of the ESA) as they work to develop certain floodplain management programs, plans and projects. No such rulings currently affect the Los Angeles area, but floodplain managers should nonetheless be aware of any potential activities that could fall under the ESA.

4.1.5 The Clean Water Act

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.

4.1.6 National Incident Management System

The National Incident Management System (NIMS) is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving floods and other hazards. The NIMS provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In other instances, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency-responder disciplines. These instances necessitate coordination across this spectrum of organizations. Communities using NIMS follow a comprehensive national approach that improves the effectiveness of emergency management and response personnel across the full spectrum of potential hazards (including natural hazards, terrorist activities, and other human-caused disasters) regardless of size or complexity.

4.1.7 Americans with Disabilities Act

The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. The most recent amendments became effective in January 2009 (P.L. 110-325). Title II of the ADA deals with compliance with the Act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations.

The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have any necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or visual alerts. Two stand-alone technical documents have been issued for shelter operators to meet the needs of people with disabilities. These documents address physical accessibility as well as medical needs and service animals.

The ADA also intersects with disaster preparedness programs in regards to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance.

4.2 STATE

4.2.1 California General Planning Law

California state law requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The general plan expresses the community's goals, visions, and policies relative to future land uses, both public and private. The general plan is mandated and prescribed by state law (Cal. Gov. Code §65300 et seq.), and forms the basis for most local government land use decision-making. The plan must consist of an integrated and internally consistent set of goals, policies, and implementation measures. In addition, the plan must focus on issues of the greatest concern to the community and be written in a clear and concise manner. City actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with the plan.

4.2.2 California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970, shortly after the federal government passed the National Environmental Policy Act, to institute a statewide policy of environmental protection. CEQA requires state and local agencies in California to follow a protocol of analysis and public disclosure of the potential environmental impacts of development projects, subject to specified exemptions. CEQA makes environmental protection a mandatory part of every California state and local agency's decision making process. It establishes a statewide environmental policy and mandates actions all state and local agencies must take to advance the policy. For any project with potentially significant environmental impacts that is not within the scope of a specified exemption, agencies must prepare a mitigated negative declaration or an environmental impact report to analyze and discuss the environmental impacts and mitigation measures.

This RLAA does not require the preparation of a mitigated negative declaration or an environmental impact report. It constitutes a feasibility and planning study for possible future actions, which the County has not approved, adopted or funded, and therefore is exempt from CEQA under Section 15262 of the CEQA Guidelines. However, future mitigation actions implemented as recommended by this RLAA may be subject to CEQA review.

4.2.3 AB 162: Flood Planning, Chapter 369, Statutes of 2007

This California State Assembly Bill passed in 2007 requires cities and counties to address flood-related matters in the land use, conservation, and safety and housing elements of their general plans. The land use element must identify and annually review the areas covered by the general plan that are subject to flooding as identified in floodplain mapping by either FEMA or the California DWR. The conservation element of the general plan must identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for the purposes of groundwater recharge and stormwater management. The safety element must identify information regarding flood hazards including (California Legislature, 2015):

- Flood hazard zones
- Maps published by FEMA, California DWR, the U.S. Army Corps of Engineers, the Central Valley Flood Protection Board, the Governor's Office of Emergency Services, etc.
- Historical data on flooding
- Existing and planned development in flood hazard zones.

The general plan must establish goals, policies and objectives to protect from unreasonable flooding risks including:

- Avoiding or minimizing the risks of flooding new development
- Evaluating whether new development should be located in flood hazard zones
- Identifying construction methods to minimize damage.

AB 162 establishes goals, policies and objectives to protect from unreasonable flooding risks. It establishes procedures for the determination of available land suitable for urban development, which may exclude lands where FEMA or California DWR has determined that the flood management infrastructure is not adequate to avoid the risk of flooding.

4.2.4 SB 379—Land Use: General Plan: Safety Element

This California Senate Bill establishes provisions that require the safety element in local general plans to be reviewed and updated to address climate adaptation and resiliency strategies. The safety element must include a vulnerability assessment, adaptation goals, policies and objectives, and implementation measures. A safety element update to comply with the law is due at the time of a jurisdiction's first local hazard mitigation plan adoption after January 1, 2017, or if no such FEMA plan has been adopted, by January 1, 2022. The bill also references specific sources of useful climate information to consult, such as Cal-Adapt.

4.2.5 California State Building Code

California Code of Regulations Title 24 (CCR Title 24), also known as the California Building Standards Code, is a compilation of building standards from three sources:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions
- Building standards authorized by the California legislature that constitute extensive additions not covered by the model codes adopted to address particular California concerns.

The state Building Standards Commission is authorized by California Building Standards Law (Health and Safety Code Sections 18901 through 18949.6) to administer the adoption, approval, publication, and implementation of California building codes. These building codes serve as the basis for the design and construction of buildings in California. The national model code standards adopted into Title 24 apply to all occupancies in California except for modifications adopted by state agencies and local governing bodies. Since 1989, the Building Standards Commission has published new editions of Title 24 every three years.

4.2.6 Standardized Emergency Management System

CCR Title 19 establishes the Standardized Emergency Management System to standardize the response to emergencies involving multiple jurisdictions. The Standardized Emergency Management System is intended to be flexible and adaptable to the needs of all emergency responders in California. It requires emergency response agencies to use basic principles and components of emergency management. Local governments must use the system in order to be eligible for state funding of response-related personnel costs under CCR Title 19 (Sections 2920, 2925 and 2930). Individual agencies' roles and responsibilities contained in existing laws or the state emergency plan are not superseded by these regulations.

4.2.7 California State Hazard Mitigation Plan

Under the DMA, California must adopt a federally approved state multi-hazard mitigation plan in order to be eligible for certain disaster assistance and mitigation funding. The intent of the California State Hazard Mitigation Plan is to reduce or prevent injury and damage from hazards in the state through the following:

- Documenting statewide hazard mitigation planning in California
- Describing strategies and priorities for future mitigation activities
- Facilitating the integration of local and tribal hazard mitigation planning activities into statewide efforts
- Meeting state and federal statutory and regulatory requirements.

The plan is an annex to the State Emergency Plan, and it identifies past and present mitigation activities, current policies and programs, and mitigation strategies for the future. It also establishes hazard mitigation goals and objectives. The plan will be reviewed and updated annually to reflect changing conditions and new information, especially information on local planning activities.

4.2.8 Governor's Executive Order S-13-08

Governor's Executive Order S-13-08 enhances the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation and extreme weather events. It includes four key actions:

- Initiate California's first statewide climate change adaptation strategy to assess expected climate change impacts, identify where California is most vulnerable, and recommend adaptation policies by early 2009. This effort will improve coordination within state government so that better planning can more effectively address climate impacts on human health, the environment, the state's water supply and the economy.
- Request that the National Academy of Science establish an expert panel to report on sea level rise impacts in California, to inform state planning and development efforts.
- Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects.
- Initiate a report on critical infrastructure projects vulnerable to sea level rise.

4.2.9 Los Angeles Regional Water Quality Control Board

The Los Angeles Regional Water Quality Control Board protects ground and surface water quality in the Los Angeles region. It is one of nine regional boards statewide under the California Environmental Protection Agency. The board conducts the following activities to protect ground and surface waters under its jurisdiction (California State Water Resources Control Board, 2015):

- Address region-wide and specific water quality concerns through updates of the Water Quality Control Plan (Basin Plan) for the Los Angeles Region.
- Prepare, monitor compliance with, and enforce waste discharge requirements.
- Implement and enforce local stormwater control efforts.
- Regulate the cleanup of contaminated sites that have polluted groundwater or surface water or have the potential to do so.
- Enforce water quality laws, regulations, and waste discharge requirements.
- Coordinate with other public agencies and groups that are concerned with water quality.
- Inform and involve the public on water quality issues.

4.2.10 California Civil Code 1102

Article 1102 of the California Civil Code establishes requirements for disclosure of information as part of real estate transactions. It applies to any transfer of real property or residential stock cooperative with one to four dwelling units, by sale, exchange, installment land sale contract, lease with an option to purchase, other option to purchase, or ground lease coupled with improvements. The code imposes disclosure duties on the seller, the seller's agent, or both. Provisions of this code require disclosure of information regarding the proximity of the subject property to areas of natural hazards, including flood, wildfire and earthquake.

4.3 LOCAL

4.3.1 General Plan

The Los Angeles County 2035 General Plan, adopted in October 2015, is the latest update to the County of Los Angeles general plan. It provides a policy framework for how and where the unincorporated County will grow through 2035. It accommodates new housing and jobs within the unincorporated areas in anticipation of population growth in the County and the broader region. The General Plan includes the following elements (Los Angeles County Department of Regional Planning, 2015b):

- Land Use Element
- Mobility Element
- Air Quality Element
- Conservation and Natural Resources Element
- Parks and Recreation Element
- Noise Element
- Safety Element
- Public Services and Facilities Element
- Economic Development Element
- Housing Element.

General Plan elements that are particularly applicable to implementation of the floodplain management plan are the Conservation and Natural Resources Element, which guides the long-term conservation of natural resources and preservation of available open space areas, and the Safety Element, which reduces the potential risk of death, injuries, and economic damage resulting from natural and human-caused hazards.

Conservation and Natural Resources Element

Watershed Management

The Conservation and Natural Resources Element of the General Plan addresses watershed management, noting that it is an effective and comprehensive way to address water resource challenges. Watershed management integrates habitat enrichment and recreation availability with water supply, flood protection, and clean runoff (Los Angeles County, 2015).

Because a watershed encompasses many jurisdictions, water supply, water quality, flood protection and natural resource issues are best managed at a regional or multiple-agency level. The County works within its jurisdiction to improve the health of rivers, streams and lesser tributaries to enhance overall water resources, runoff quality and wildlife habitat. However, watershed integration requires the County to also participate with other stakeholders to manage the function and health of watersheds. Collaboration with local stakeholders and jurisdictions and with educational and professional institutions is needed to develop and implement watershed plans to protect and augment local water supplies, maintain flood protection standards, provide assistance in the event of flooding, encourage recreational opportunities, conserve habitats of native species, and improve the quality of water that flows to rivers, lakes, and the ocean.

Significant Ecological Areas and Coastal Resource Areas

The Conservation and Natural Resources Element of the General Plan establishes the Significant Ecological Area (SEA) designation for land that contains irreplaceable biological resources. Coastal Resource Areas (CRAs) are located within the coastal zone and include biological resources equal in significance to SEAs. The General Plan identifies 21 SEAs and 9 CRAs. Two CRAs are linked to SEAs that are not entirely within CRAs (the Santa Monica Mountains Coastal Zone and Palos Verde Coastline) (Los Angeles County, 2015):

- Significant Ecological Areas
  - Cruzan Mesa Vernal Pools
  - East San Gabriel Valley
  - Griffith Park
  - Harbor Lake Regional Park
  - Joshua Tree Woodlands
  - Madrona Marsh Preserve
  - Palos Verdes Peninsula and Coastline
  - Puente Hills
  - Rio Hondo College Wildlife Sanctuary
  - San Andreas
  - San Dimas Canyon / San Antonio Wash
  - San Gabriel Canyon
  - Santa Clara River
  - Santa Felicia
  - Santa Monica Mountains
  - Santa Susana Mountains / Simi Hills
  - Tujunga Valley / Hansen Dam
  - Valley Oaks Savannah
  - Verdugo Mountains
- Coastal Resource Areas
  - El Segundo Dunes
  - Malibu Coastline
  - Palos Verdes Coastline (ocean and shoreline portions)
  - Point Dume
  - Santa Catalina Island
  - Coastal Zone of the Santa Monica Mountains
  - Terminal Island (Pier 400)

The objective of the SEA Program is to conserve genetic and physical diversity by designating biological resource areas that are capable of sustaining themselves into the future. However, SEAs are not wilderness preserves. Much of the land in SEAs is privately is held, used for public recreation, or abuts developed areas. The SEA program must therefore balance the overall objective of resource preservation against other critical public needs. The General Plan goals and policies are intended to ensure that privately held lands within the SEAs retain the right of reasonable use, while avoiding activities and developments that are incompatible with the long-term survival of the SEAs (Los Angeles County, 2015).

Safety Element

Flooding is among the natural hazards addressed in the Safety Element of the General Plan. The element presents goals and policies for uses in flood hazard zones, as well as tsunami hazard areas and potential dam failure inundation areas. It also addresses the potential impact on flooding of sea level rise associated with climate change (Los Angeles County, 2015).

4.3.2 Community Plans

The Los Angeles County General Plan (2015) serves as the foundation for community-based plans, such as area plans, community plans, and coastal land use plans. Area plans focus on land use and policy issues that are specific to the planning area. Community plans cover smaller geographic areas within the planning

area and address neighborhood and/or community-level policy issues. Coastal land use plans are components of local coastal programs; they regulate land use and establish policies to guide development in the coastal zone. The following is a list of community-based plans in Los Angeles County:

- Altadena Community Plan
- Antelope Valley Area Plan
- East Los Angeles Community Plan
- Hacienda Heights Community Plan
- Marina del Rey Local Coastal Land Use Plan
- Malibu Local Coastal Land Use Plan
- Rowland Heights Community Plan
- Santa Monica Mountains North Area Plan
- Santa Catalina Island Local Coastal Land Use Plan
- Santa Clarita Valley Area Plan
- Twin Lakes Community Plan
- Walnut Park Neighborhood Plan
- West Athens-Westmont Community Plan.

4.3.3 Watershed Management Program

Municipalities and community stakeholders throughout Los Angeles County developed a total of 19 collaborative Watershed Management Programs and Enhanced Watershed Management Programs for the county's six watersheds—Dominguez Channel, Los Angeles River, Los Cerritos Channel, San Gabriel River, Santa Monica Bay and Upper Santa Clara River. Each Watershed Management Group meets regularly to implement its plan. The draft plans were submitted to the Los Angeles Regional Water Quality Control Board by June 30, 2015, or sooner.

Each plan identifies activities to improve water quality, promote water conservation, enhance recreational opportunities, manage flood risk, improve aesthetics, and support public education. Each includes water quality priorities, watershed control measures, the scheduling of projects, and monitoring, assessment and adaptive management for projects. The plans will rely heavily on three important approaches:

- **Regional Multi-Benefit Projects** —Regional Multi-benefit projects retain, divert or treat stormwater and non-stormwater from subwatershed areas, while also providing water conservation, flood, recreation, habitat and other benefits.
- **Green Street Projects** —Green street projects implement designs for paved areas using permeable materials and drought-tolerant plants to capture, clean or infiltrate rain water. Green infrastructure projects help to clean surface water bodies, recharge groundwater supplies, beautify neighborhoods, and cool communities by increasing the amount of vegetation.
- **Low Impact Development**—Low impact development uses site design and best management practices to address runoff and pollution at the source. These practices can effectively remove nutrients, bacteria, and metals while reducing the volume and intensity of stormwater flows.

4.3.4 Greater Los Angeles County Region Integrated Regional Water Management Plan

The 2013 Integrated Regional Water Management (IRWM) Plan Update defines the vision and direction for the sustainable management of water resources in the Greater Los Angeles County Region for the next 20 years through collaborative planning. The Plan identifies a comprehensive set of solutions to achieve the following objectives over the 25-year planning horizon:

- Reduce the Region's reliance on imported water
- Comply with water quality regulations by improving the quality of urban runoff
- Stormwater and wastewater
- Protect, restore and enhance natural processes and habitats
- Increase watershed friendly recreational space for all communities
- Reduce flood risk in flood prone areas by either increasing protection or decreasing needs using integrated flood management approaches
- Adapt to and mitigate against climate change vulnerabilities.

Since 2006, the Greater Los Angeles County Region has supported the development and implementation of projects that reduce reliance on imported water, provide improved water quality and protect natural resources, including 52 projects that were awarded over $100 million of implementation grant funding.

4.3.5 Los Angeles County Flood Control District

The Los Angeles County Flood Control Act was adopted by the State Legislature in 1915 after a regional flood took a heavy toll on lives and property. The act established the Los Angeles County Flood Control District and empowered it to provide flood protection, water conservation, recreation and aesthetic enhancement. The Flood Control District is governed, as a separate entity, by the County of Los Angeles Board of Supervisors. In 1984, the Flood Control District entered into an operational agreement transferring planning and operational activities to the Los Angeles County Department of Public Works.

Within the Greater Los Angeles County area, the Flood Control District and the U.S. Army Corps of Engineers share responsibilities for managing flood risk. The Flood Control District is the primary agency able to address large regional drainage needs. It uses available funds to operate and maintain flood control facilities and systems that cross various cities. In years of heavy rainfall, the flood control system has largely prevented serious flooding that affected the Los Angeles area many years ago.

The Flood Control District encompasses 2,752 square miles, six major watersheds and 85 cities. Its flood protection and water conservation system is one of the largest in the world. It includes 14 major dams and reservoirs, 487 miles of open channels, 162 debris dams, 2,919 miles of underground storm drain and more than 80,000 catch basins. Efforts to rehabilitate flood control facilities also consider other beneficial uses of those facilities, such as environmental restoration, enhancement of water quality, and recreation.

4.3.6 Antelope Valley Comprehensive Plan and Amendments

Los Angeles County originally developed a comprehensive plan for the Antelope Valley, an unincorporated section of the County, in 1987. The Antelope Valley differs from other parts of the County because it lacks an ocean drainage outlet. It also lacks defined natural channels below the foothills, as well as a comprehensive flood control system, resulting in unpredictable and varying flood risk across the valley floor. The plan explores flood control and water conservation measures to reduce the negative effects of regional private development and to better address local flood hazard needs. It seeks to provide a cohesive approach to drainage, stormwater management, and flood risk mitigation. The plan evaluates the fee structures available to finance drainage solutions (Los Angeles County Department of Public Works, 1987). Two amendments to the original plan update costs and drainage fees to continue implementing recommended improvements (Los Angeles County Department of Public Works, 1991 and 2006).

4.3.7 Antelope Valley Integrated Regional Water Management Plan

The Antelope Valley Integrated Regional Water Management group developed a water resource management plan in 2007. The 2007 plan was updated in 2013 to reflect new state integrated planning requirements, include more detailed and updated content, and solicit future project funding opportunities. The 2013 Antelope Valley IRWM Plan explores key issues, including uncertain and variable water supply, water demand exceeding supply, water quality and flood management, environmental resources, water management and land use, and climate change. It identifies and prioritizes a series of projects to address key concerns in the region, particularly those related to water supply (Antelope Valley Integrated Regional Water Management Group, 2013).

4.3.8 Upper Santa Clara River Watershed Integrated Regional Water Management Plan

The Upper Santa Clara River Watershed Integrated Regional Water Management group developed a water resource management plan that was last updated in 2014. The 2014 Upper Santa Clara River Watershed IRWM Plan examines current and future water-related needs, identifies regional objectives for water-related resource management, develops strategies to address identified needs, and evaluates projects to meet the regional objectives. It integrates planning and implementation and facilitates regional cooperation, with the goals of reducing water demand, improving operational efficiency, increasing water supply, improving water quality, and promoting resource stewardship over the long term (Los Angeles County, 2015a).

4.3.9 Sediment Management Strategic Plan

The Los Angeles County Flood Control District developed a Sediment Management Strategic Plan in response to challenges in managing sediment. These challenges included recent wildfires that led to an increased inflow of sediment and debris and increased pressure on the capacity of sediment placement sites. This plan provides an overview of sediment management issues and evaluates various projects. It is guided by the following objectives:

- Maintaining flood risk management and water conservation
- Recognizing opportunities for increased environmental stewardship
- Reducing social impacts related to sediment management
- Identifying ways to use sediment as a resource
- Ensuring that the Flood Control District is fiscally responsible in its decision-making.

The plan is to be effective from 2012 to 2032 (Los Angeles County Department of Public Works, 2012).

4.3.10 Local Coastal Programs

The County of Los Angeles Local Coastal Programs (LCPs) comply with the 1976 Coastal Act, enacted by the California Legislature, which requires coastal cities and counties to establish coastal resource conservation and development programs. The LCPs consist of planning and regulatory measures that manage short-term and long-term development in the coastal zone. Each LCP includes a land use plan and implementation action plan. LCPs must consider the unique factors of the coastal community, as well as regional and state concerns. The County of Los Angeles has LCPs for three unincorporated areas: the Santa Monica Mountains, Marina Del Rey, and Santa Catalina Island.

4.3.11 Los Angeles County Low Impact Development Ordinance

In November 2012, the Los Angeles Regional Water Quality Control Board adopted a Municipal Separate Storm Sewer System (MS4) Permit to regulate stormwater and non-stormwater discharges within the Los Angeles region. The 2012 MS4 Permit included Low Impact Development (LID) requirements for certain projects to reduce the discharge of stormwater and associated pollutants into receiving water bodies and to control hydromodification. In November 2013, Los Angeles County amended its LID Ordinance in response to the 2012 MS4 Permit. The LID Ordinance applies to certain new development and re-development projects and is intended to:

- Lessen adverse impacts of stormwater and urban runoff from development on natural drainage systems, receiving waters and other water bodies;
- Minimize pollutant loadings from impervious surfaces by requiring certain projects to incorporate appropriate Best Management Practices and other LID strategies; and;
- Minimize erosion and other hydrologic impacts on natural drainage systems by requiring appropriate hydromodification controls.

4.3.12 Los Angeles County Operational Area Emergency Response Plan

The Los Angeles County Operational Area Emergency Response Plan (ERP) provides details for coordinated response to large-scale emergency situations in the County, whether natural, man-made, or technological. The ERP focuses on potentially catastrophic disasters that require more than normal response measures. It reviews capabilities in prevention, protection, response, recovery, and mitigation. It contains information about continuity of government plans and provides annexes for specific situations, including tsunamis, oil spills, and terrorism (Los Angeles County, 2012).

4.3.13 Topanga Creek Watershed Management Plan

In 2002, the Topanga Creek Watershed Committee updated the 1996 Topanga Creek Watershed Management Study with new preventive planning strategies and best management practices. These projects and practices were developed to maintain and enhance the watershed's current physical, chemical, biological, economic, and social characteristics, including its diversity in land use (i.e., residential, business development, infrastructure, wilderness recreation, and biological habitat). The plan also seeks to protect life and property from vulnerability to natural hazards such as stormwater runoff, floods, earthquakes, and wildfires (Topanga Creek Watershed Committee, 2002).

4.3.14 Rio Hondo Watershed Management Plan

The Rio Hondo Watershed Management Plan provides goals and strategies to all affected municipalities and conservation organizations as a way to improve water quality, health, habitat and recreational opportunities for the Rio Hondo watershed. The Rio Hondo watershed is a sub-watershed of the Los Angeles River watershed and is linked to the San Gabriel River watershed as a result of both natural hydrologic processes and human intervention. The watershed contains both rural and urban areas, with the San Gabriel Mountains and Angeles National Forest defining the upper reaches and the more urban and developed San Gabriel Valley below the foothills. The watershed encompasses 22 cities and six unincorporated communities in Los Angeles County (San Gabriel Valley Council of Governments, 2004).

4.3.15 Gateway Watershed Management Program

The Gateway Watershed Management Authority is a coalition of 25 cities and government entities that manage regional water planning needs for the Gateway Cities region. The Gateway Watershed Management Authority developed an integrated regional water management plan in 2013. Although the plan primarily focuses on needs for cities in this region, it includes a few unincorporated County areas. Recommendations developed for this plan include coordinating regional water management efforts, continued maintenance of projects and grant opportunities, addressing MS4 permit watershed monitoring and reporting, and developing a funding and finance plan to implement projects (Gateway Management Authority, 2013).

4.3.16 Los Angeles River Master Plan and Corridor Highlights

The Los Angeles River watershed covers 834 square miles and extends from the Santa Monica Mountains to the Simi Hills and from the Santa Susana Mountains to the San Gabriel Mountains. The Los Angeles River is a valuable resource for the County, as well as a major source of flooding. The County developed the Los Angeles River Master Plan in 1996 to seek ways to utilize the natural assets of the Los Angeles basin for economic, recreational, and environmental benefits while maintaining the waterway as a flood protection resource. The plan highlights water conservation as a major concern, noting that 30 to 40 percent of the County's water supply comes from local sources. It also recommends multi-use and multi-benefit projects, which not only strengthen flood control measures but also educate citizens, create environmental habitats, or increase recreational opportunities (Los Angeles Department of Public Works, 1996).

In 2005, the County released the Master Plan and Corridor Highlights document, which provides information about Master Plan projects implemented since the Master Plan's adoption and those planned for the future. Many of the projects are structural, but highlights also include natural resource preservation, education and outreach projects. Where sufficient data was available, the report documents specific benefits as well as implementation and location information (Los Angeles Department of Public Works, 2005).

4.3.17 Los Angeles County Annual Hydrologic Reports

Los Angeles County releases an annual report containing hydrologic data relevant to the County; the most recent report covers October 2013 through September 2014. The report is organized into eight major sections providing background and statistics on the following areas:

- **Los Angeles County—**County's topography, geology, and land use
- **Runoff**—Mean daily and peak annual runoff flow rates for active stream gaging stations
- **Flood Control District**—Flood events summaries
- **Reservoirs**—Summary of annual inflow, outflow and storage for County dams and reservoirs
- **Precipitation**—Daily and annual rainfall data from County rain gage stations
- **Erosion control**—Debris basin design data, production summary, and production history
- **Evaporation**—Data for the County's active evaporation stations
- **Water conservation**—Groundwater recharge facility data and historical well data

These reports are a valuable resource for County personnel evaluating water management and needs (Los Angeles County Department of Public Works, 2015a).

4.3.18 Los Angeles County Drainage Area Project

The Los Angeles County Drainage Area Project is a multi-use project to reduce flood overflows by increasing the carrying capacity of major County waterways, including the lower Los Angeles River, Rio Hondo, and lower Compton Creek. The project is designed to increase recreational opportunities and local aesthetics through improvements, such as a bike trail, equestrian trail, and landscaping. The Los Angeles County Drainage Area project includes the elevation of 21 miles of existing levees; the modification of 24 railroad, traffic, utility, and pedestrian bridges; and connections between trails and eight park areas (Los Angeles County Department of Public Works, 2015c).

4.3.19 Trash Best Management Practices

The 2004 *Technical Report of Trash Best Management Practices* identifies necessary measures to meet trash total maximum daily load goals for the Los Angeles River and Ballona Creek. Recommendations include trash and runoff source-control best management practices as the top preference. Also recommended are structural projects for high-trash generation areas, such as drain system retrofits, channel-cleaning contracts, and replacement of impervious surfaces (Los Angeles County Department of Public Works, 2004). Keeping flood control facilities, including catch basins, free from trash and debris helps prevent localized street flooding.

4.3.20 Los Angeles County Response to ADA

The Los Angeles County Operational Area Emergency Response Plan Access and Functional Needs Annex defines the term "individuals with disabilities and access and functional needs" as populations whose members may have additional needs before, during and after an incident in functional areas including but not limited to the following:

- Maintaining independence
- Communication
- Transportation
- Supervision
- Medical care.

These populations may include any of the following:

- Individuals with mobility and transportation impairments
- Individuals with vision, hearing and dual sensory impairment
- Individuals with health, behavioral and mental health needs
- Individuals with intellectual and developmental disabilities
- Individuals who live in institutionalized settings
- Elderly and children
- Culturally diverse populations
- Individuals with limited English proficiency or non-English speakers
- Individuals with socio-economic barriers, including the homeless population.

Reasonable Accommodations Ordinance

The ordinance, which was adopted by the Board of Supervisors on November 28, 2011, creates an administrative procedure for persons with disabilities to request reasonable accommodation from land use and zoning standards or procedures, when those standards or procedures are a barrier to equal housing access, pursuant to state and federal Fair Housing laws. The ordinance applies to all the unincorporated areas of Los Angeles County.

Plan Action Implementation

The ADA protocol will be applied when implementing any actions in this plan that could impact individuals with disabilities and access and functional needs. This will involve measures such as review by the Los Angeles County Access and Functional Needs Committee or whatever protocol has been established by the County at the time of project implementation.

4.4 CAPABILITY ASSESSMENT

The planning team performed an inventory and analysis of existing authorities and capabilities called a "capability assessment." A capability assessment creates an inventory of an agency's mission, programs and policies, and evaluates its capacity to carry them out. Table 4-1 summarizes the legal and regulatory capability of Los Angeles County. This table describes the legal authorities available to the county and/or enabling legislation at the state level affecting planning and land management tools that can support repetitive loss area action items. A qualifying explanation of the each of the categories is as follows:

- **Local Authority**: Does the County have the authority to implement the identified capability through policy or formal adoption?
- **State of Federal Prohibitions**: Are there are any regulations that may impact the implementation of an identified capability that are enforced or administered by another agency (e.g., a state agency or special purpose district)?
- **Other Regulatory Authority**: Are there are any regulations that may impact the implementation of a capability that are enforced or administered by another agency (e.g., a state agency or special purpose district)? This can also be referred to as delegated authority.
- **State Mandated**—Do state laws or other requirements enable or require the listed item to be implemented at the local level?

Table 4-2 summarizes fiscal capability of Los Angeles County. This table identifies what financial resources (other than grants) are available to the county to support the implementation of repetitive loss area action items.

Table 4-3 summarizes the County's participation in flood-related national programs. These programs rank and evaluate the County's capabilities to implement flood hazard reduction programs such as building code enforcement and flood warning and response activities.

Table 4-4 summarizes the administrative and technical capability of Los Angeles County. This table inventories the staff/personnel resources available to Los Angeles County to help with flood hazard mitigation planning and the implementation of specific mitigation actions.

TABLE 4-1.
LOS ANGELES COUNTY LEGAL AND REGULATORY CAPABILITY

	Local Authority	State or Federal Prohibitions	Other Regulatory Authority	State Mandated
Codes, Ordinances & Requirements				
Building Code	Yes	No	No	Yes
Comment: County of Los Angeles County Code, Title 26 – Building Code				
Zoning Code	Yes	No	No	Yes
Comment: County of Los Angeles County Code, Title 22 – Planning and Zoning				
Subdivisions	Yes	No	No	No
Comment: County of Los Angeles County Code, Title 21 – Subdivision Code				
Post-Disaster Recovery	Yes	No	No	No
Comment: County of Los Angeles County Code, Title 2 – Administration, Division 3 – Departments and Other Administrative Bodies, Chapter 2.68 – Emergency Services, Part 6 – Director of Recovery Operations				
Flood Damage Prevention Ordinance	Yes	No	No	No
Comment: County of Los Angeles County Code: Title 26, Chapter 1, Section 110 – Prohibited Uses of Building Sites Title 11, Division 3, Chapter 11.60 – Floodways and Water Surface Elevations Title 21, Chapter 21.44.320 – Land subject to flood hazard, inundation, or geological hazard Title 21, Chapter 21.44.330 – Flood-hazard area, floodway or natural watercourse designation Title 20, Division 5, Chapter 20.94 – Channels Title 22, Division 1, Chapter 22.52, Part 5 – Flood Control				
Low-Impact Development Standards	Yes	No	No	Yes
Comment: County of Los Angeles County Code, Title 12 – Environmental Protection, Chapter 12.84 Low Impact Development Standards				
Real Estate Disclosure	No	No	No	Yes
Comment: State of California Natural Hazards Disclosure Act, effective June 1, 1998 (California Civil Code Section 1103.2)				
Growth Management	No	No	Yes	Yes
Comment: County of Los Angeles County Code, Title 22 – Planning and Zoning, Chapter 22.46 – Specific Plans. Specific Plans are available for Santa Catalina Island, Marina Del Rey, Universal Studios, and East Los Angeles Third Street.				
Site Plan Review	Yes	No	No	No
Comment: County of Los Angeles County Code, Title 26 – Building Code, Chapter 1 – Administration, Inspections.				
Special Purpose (flood management, critical areas)	—	—	—	—
Comment: County of Los Angeles County Code, Title 11 – Health and Safety, Division 2 – General Hazards, Chapter 11.52 – Water Hazards. County of Los Angeles County Code, Title 11 – Health and Safety, Division 3 – Miscellaneous Regulations, Chapter 11.60 – Floodways and Water Surface Elevations. County of Los Angeles County Code, Title 12 – Environmental Protection, Chapter 12.80 – Stormwater and Runoff Pollution Control Angeles County Code, Title 12 – Environmental Protection, Chapter 12.20 – Depositing Petroleum Products on Beaches or into Pacific Ocean County of Los Angeles County Code, Title 20 – Utilities, Division 5 – Flood Control District Property and Facilities County of Los Angeles County Code, Flood Control District Code, Chapter 21 – Stormwater and Runoff Pollution Control County of Los Angeles County Code, Title 31 – County Green Building Standards Code				

TABLE 4-1.
LOS ANGELES COUNTY LEGAL AND REGULATORY CAPABILITY

	Local Authority	State or Federal Prohibitions	Other Regulatory Authority	State Mandated
Planning Documents				
General Plan	Yes	No	No	Yes
Comment: Los Angeles County 2035 General Plan, October 2015. Draft plan includes several major policies, specifically, expanding transit-oriented districts, promoting mixed-use, expanding significant ecological areas, creating employment protection districts, protecting agricultural resources, and ensuring zoning consistency with amendments to existing County ordinances. Available online				
Capital Improvement Plan	Yes	No	No	No
Comment: The Los Angeles County Department of Public Works develops and implements capital projects, and manages those projects implemented by a project consultant. The 2035 General Plan Implementation Program identifies a goal project of the Department of Regional Planning and the Department of Public Works jointly securing funding and setting priorities to prepare capital improvement plans for the County's 11 planning areas. Some current community plans have capital improvements listed, but level of detail varies based on community and plan age.				
Economic Development Plan	Yes	No	No	No
Comment: Los Angeles County Strategic Plan for Economic Development, 2016 2035 General Plan, Chapter 14 – Economic Development Element. Available online				
Floodplain or Basin Plan	Yes	No	No	No
Comment: Los Angeles County Floodplain Management Plan, 2010. Available online.				
Stormwater Plan	Yes	No	Yes	Yes
Comment: Low Impact Development Standards Manual, February 2014				
Watershed Management Plan	Yes	No	Yes	No
Comment: Enhanced Watershed Management Programs in progress and to be submitted for approval to the Los Angeles Regional Water Quality Control Board by June 28, 2015. These plans will include the County's five watersheds: Ballona Creek, Dominguez Channel, Marina Del Ray, Santa Monica Bay, and Upper Los Angeles River. All available online. Other unincorporated community watershed management plans: Topanga Creek, Upper Santa Clara River, Rio Hondo and Gateway Cities Region				
Habitat Conservation Plan	No	No	No	No
Comment: 2035 General Plan, Chapter 9 – Conservation and Natural Resources Element, Significant Ecological Areas. Available online				
Shoreline Management Plan	Yes	No	No	Yes
Comment: Los Angeles County Stormwater Monitoring Reports, Section 1.1.1.4 – Shoreline Monitoring (released annually and with most recent report of 2014-2015) Local Coastal Programs (LCP) • Santa Monica Mountains LCP, adopted on August 26, 2014, and certified on October 10, 2014 • Marina Del Rey LCP, adopted in 1996, and amended and certified in 2012 • Santa Catalina Island LCP, adopted on March 15, 1983, and certified on November 17, 1983 All available online				
Emergency Response Plan	Yes	No	No	Yes
Comment: Los Angeles County Operational Area Emergency Response Plan (ERP), 2012. Available online				
Post-Disaster Recovery Plan	Yes	No	No	No
Comment: Recovery Annex to the ERP ERP, Section 2.7: Recovery Considerations also reviews County Recovery Procedures				
Sediment Management Plan	Yes	No	No	No
Comment: Sediment Management Strategic Plan, 2012-2032. Available online				

TABLE 4-1.
LOS ANGELES COUNTY LEGAL AND REGULATORY CAPABILITY

	Local Authority	State or Federal Prohibitions	Other Regulatory Authority	State Mandated
Continuity of Operations Plan	Yes	No	No	Yes
Comment: All Los Angeles County departments and/or divisions must develop, exercise, and maintain plans for business continuity functions and processing resources. Each department and/or division must develop a plan for its business operations that can sufficiently support the service requirements of other operations and functions involved in the incident. Plans must address the full range of resources including data processing, data communications links, personnel, personal computers, terminals, workspace, voice communication, and documents. Additionally, Chapter 3 of the ERP includes Continuity of Government information.				
Water Resource Management Plan	Yes	No	Yes	Yes
Comment: Greater Los Angeles County Region Integrated Regional Water Management Plan, 2013, Antelope Valley Integrated Regional Water Management Plan, 2013, Upper Santa Clara River Watershed Integrated Regional Water Management Plan, 2014				
Best Management Practices	—	—	—	—
Comment: Technical Report of Trash Best Management Practices, 2004 These best management practices were identified and evaluated to provide effective alternatives to meet the goals of the trash total maximum daily load for Los Angeles River and Ballona Creek.				

TABLE 4-2.
FISCAL CAPABILITY

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding (Flood Control District)	Yes
Authority to Levy Taxes for Specific Purposes	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
State Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

TABLE 4-3.
COMMUNITY CLASSIFICATIONS

	Participating?	Classification	Date Classified
Community Rating System	Yes	7	05/1/2011
Building Code Effectiveness Grading Schedule	Yes	3/3	2010
StormReady	No	N/A	N/A
TsunamiReady	No	N/A	N/A

TABLE 4-4.
ADMINISTRATIVE AND TECHNICAL CAPABILITY

Staff/Personnel Resources	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Los Angeles County Department of Public Works (DPW) Land Development Division; Los Angeles County Department of Regional Planning
Engineers or professionals trained in building or infrastructure construction practices	Yes	Los Angeles County DPW Geotechnical and Materials Engineering Division; Los Angeles County DPW Building and Safety Division
Planners or engineers with an understanding of flooding hazards	Yes	Los Angeles County DPW Geotechnical and Materials Engineering Division; Los Angeles County DPW Water Resources Division and associated subdivisions
Staff with training in benefit/cost analysis	Yes	Los Angeles County DPW multiple divisions, including the Watershed Management Division
Floodplain manager	Yes	Los Angeles County DPW Watershed Management Division
Surveyors	Yes	Los Angeles County DPW Survey/Mapping and Property Management (Land Records) Division
Personnel skilled or trained in GIS applications	Yes	Los Angeles County DPW Survey/Mapping and Property Management (Land Records) Division; Los Angeles County DPW GIS Managers
Scientists familiar with flooding hazards in local area	Yes	Los Angeles County DPW Water Resources Division and associated subdivisions
Emergency manager	Yes	Los Angeles County DPW Disaster Services Group; Los Angeles County Office of Emergency Management
Grant writers	Yes	Los Angeles County DPW Watershed Management Division, Water Resources Division, and Programs Development Division ; Los Angeles County Office of Emergency Management

CHAPTER 5.
MITIGATED REPETITIVE LOSS PROPERTIES

5.1 REPETITIVE LOSS LIST CORRECTION

As part of their application and cycle verification obligations, CRS-participating communities must review their lists of repetitive-loss properties for accuracy, for correct addresses, to determine whether the properties are actually in the community's corporate limits, and to determine whether the insured buildings have been removed, retrofitted or otherwise protected from the cause of the repetitive flooding. The result of this review is recorded on a Repetitive Loss Update Worksheet (AW-501; see Figure 5-1). A community with repetitive losses must sign the Repetitive Loss List Community Certification, CC-RL, certifying that each address has been checked. If there are updates, the submittal must include corrected Repetitive Loss Update Worksheets (AW-501) with any required supporting documentation. The community must note the following situations in which the form should be updated:

1. The property is not located in the community's jurisdiction. The property may be outside the community's corporate limits, it may be in another city, or it may have been annexed by another community. If it can be determined in which community the property belongs, the property will be reassigned to the correct community. If a property is not in the community, it will not be reassigned unless the community in which the property does belong can be definitely identified.
2. There was an error in the repetitive loss data base, such as a duplicate listing or an incorrect address.
3. The property has subsequently been protected from the types of events that caused the losses. Buildings that have been acquired, relocated, retrofitted, or otherwise protected from the types of frequent floods that caused the past damage are not counted in determining the community's CRS requirements.
4. The property is protected from damage by the base flood shown on the current Flood Insurance Rate Map (FIRM). For example, the community may demonstrate that the building is elevated or flood-proofed above the base flood elevation but was flooded by a higher level. If the property is outside the Special Flood Hazard Area, the community may show that all of the repetitive losses were caused by events with recurrence intervals of over 100 years (e.g., two 200-year storms).

5.2 MITIGATED REPETITIVE LOSS PROPERTIES

For corrections made under situations 3 or 4 above, all future AW-501s issued for the community will be segregated into two categories; mitigated and unmitigated.

Los Angeles County is using the ISO repetitive loss list and AW-501s dated January 31, 2011 as the basis for this Repetitive Loss Area Analysis. This is the last officially sanctioned CRS repetitive loss data set issued to Los Angeles County. According to the AW-501s issued, Los Angeles County has 55 repetitive loss properties, of which four are recognized as "mitigated." The mitigated properties are shown in Table 5-1. No area analysis will be conducted for these properties.

Federal Emergency Management Agency
National Flood Insurance Program
OMB #1660-0022 EXPIRES Sept 30, 2013

NFIP REPETITIVE LOSS UPDATE WORKSHEET (AW-501)

THE INFORMATION ON THE FORM IS BASED ON CLAIMS ON OR BEFORE 01/31/2011

REPETITIVE LOSS NUMBER: 0987654

Internal Use Only		A		N/A		FRR

NFIP Community Name: BALDWIN COUNTY* | CID#: 015000

Local Property Identifier: 56-09-29-0-999-000

Current Property Address	Previous Property Address/Community ID#
12345 MEMORY LANE FAIRHOPE AL 365325963	

Last Claimant:

Insured: YES | Named Insured: ELMER FLOOD

Dates of Losses: | Total Number of Losses for Property: 2

20040916 | 19980927

REQUESTED UPDATES
MARK ALL UPDATES BELOW THAT APPLY (IMPORTANT - SEE INSTRUCTIONS)

1. INFORMATION PROVIDED NOT SUFFICIENT TO IDENTIFY PROPERTY.
   Choose this update if all attempts to locate the property fail. Please describe the steps you took to locate the property in the comments section below.

2. COSMETIC CHANGES REQUIRED TO THE ADDRESS:
   Update the address shown above and/or add your local alternative property identifier such as a Tax Assessor #.

3. PROPERTY NOT IN OUR COMMUNITY OR JURISDICTION:
   Choose this update if you have positively determined that the property shown is not located in your community. Please provide the correct NFIP community name and if known the NFIP Community ID Number. If available, please attach a map showing the property location.

   ASSIGN TO NFIP COMMUNITY NAME: _____ NFIP COMMUNITY ID # _____

4. X FLOOD PROTECTION PROVIDED.
   Choose this update if some type of structural intervention has occurred to the building, property or the source of flooding that protects the building from future events similar to those that occurred in the past. The update must be supported by documentation such as an Elevation Certificate and the Mitigation action and funding information below must be provided.

   Mitigation Action 1.) F **Source of Primary Mitigation Funding 3.) Q** **Secondary Source of Funding 3.) W**

5. NO BUILDING ON PROPERTY.
   Choose this update only if the property in question can be positively identified as the site of the previously flooded building and documentation is available to support that an insurable building no longer exists at this site. The update must be supported by documentation such as a Demolition or Relocation Permit and the Mitigation action and funding information below must be provided.

   Mitigation Action 2.) **Source of Primary Mitigation Funding 3.)** **Secondary Source of Funding 3.)**

   See Appropriate Mitigation Action and Funding Codes

6. DUPLICATE LISTING WITH RL NUMBER: _____ COMBINE AS ONE LISTING.
   Choose this update to identify two or more separate listings that are for the same building. List all other RL numbers that are duplicates to this property. Please indicate which address shown is the correct address to use.

7. HISTORIC BUILDING:
   Choose this update if you know the building is or would be eligible to be listed on a State or National Historic Registry.

COMMENTS SECTION:
Previously updated - this property is no longer considered a RL property
Updated as - Flood protection provided - on 11/05/2009

A signed RL Transmittal Sheet must accompany this form for approval of the update!

03/31/2011 PAGE 73 OF 448

Figure 5-1. Example AW-501

TABLE 5-1.
MITIGATED REPETITIVE LOSS PROPERTIES

Repetitive Loss Number	Date Corrected
0014896	April 25, 1995
0017933	May 10, 1995
0028337	June 11, 1996
0049465	May 10, 1995

CHAPTER 6.
MITIGATION ALTERNATIVES CONSIDERED

Although this report presents separate analyses for each identified repetitive loss area in unincorporated Los Angeles County, the list of potential measures to address repetitive flooding problems was the same for each area. This chapter summarizes the alternatives that were identified for consideration. These alternatives can be implemented by the County, the homeowner, or other entities. The selection of suitable alternatives for each at-risk property in the repetitive loss areas is described in the chapters presenting individual repetitive loss area analyses.

Many types of flood hazard mitigation exist, and there is not one mitigation measure that fits every case or even most cases. Successful mitigation often requires multiple strategies. The CRS Coordinator's Manual (FEMA FIA-15, 2013) breaks the primary types of mitigation down as follows:

- **Preventive** activities keep flood problems from getting worse. The use and development of flood-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices
- **Property protection** activities are usually undertaken by property owners on a building-by-building or parcel basis.
- **Natural resource protection** activities preserve or restore natural areas or the natural functions of floodplain and watershed areas. They are implemented by a variety of agencies, primarily parks, recreation, or conservation agencies or organizations.
- **Emergency services** are measures taken during an emergency to minimize its impact. These measures are usually the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.
- **Structural projects** keep floodwaters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff.
- **Public information** activities advise property owners, potential property owners, and visitors about hazards and ways to protect people and property from them, as well as the natural and beneficial functions of local floodplains. They are usually implemented by a public information office.

6.1 PREVENTIVE

Los Angeles County regulates residential and commercial development through its building code, planning and zoning requirements, stormwater management regulations and floodplain management ordinances. Any project located in a floodplain, regardless of its size, requires a permit from Los Angeles County, unless the project can be characterized as routine maintenance.

6.2 PROPERTY PROTECTION

These measures are generally performed by property owners or their agents. FEMA has published numerous manuals that help a property owner determine which property protection measures are appropriate for particular situations:

- FEMA 259, Engineering Principles and Practices of Retrofitting Floodprone Residential Structures
- FEMA 312, Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding
- FEMA 551, Selecting Appropriate Mitigation Measures for Floodprone Structures
- FEMA 348, Protecting Building Utilities from Flood Damage
- FEMA 511, Reducing Damage from Localized Flooding
- FEMA 102, Floodproofing Non-Residential Structures
- FEMA 84, Answers to Questions about the NFIP
- FEMA 54, Elevated Residential Structures Book
- FEMA 268, Protecting Floodplain Resources: A Guidebook for Communities
- FEMA 347, Above the Flood: Elevating Your Floodprone House
- FEMA 85, Protecting Manufactured Homes from Floods and Other Hazards

The manuals listed above are available for review at FEMA's website. For a complete guide to retrofitting homes for flood protection, see FEMA P-312, *Homeowner's Guide to Retrofitting 3rd Edition* (2014). The primary methods of property protection in Los Angeles County are:

- Demolition/relocation.
- Elevation (structure or damage prone components such as furnace or AC unit)
- Dry flood-proof (so water cannot get in).
- Wet flood-proof portions of the building (so water will not cause damage).
- Direct drainage away from the building.
- Drainage maintenance.
- Sewer Improvements.

6.2.1 Acquisition

One of the most effective approaches to preventing further flood damage to a building is acquisition and relocation or clearing of the structure. The property would then serve as open space or recreation area. Property owners retain the right to select this as a mitigation method. They may sell their property to a government agency or an agency dedicated to the preservation and management of local open space. The property owner can also relocate the building to another property. Alternatively, the building can be moved to another area of the same property, if that area is outside the flood hazard. The property owner can also take advantage of federal funding for such mitigation.

For the Los Angeles County RLAA, it has been determined that acquisition would not be a cost-effective alternative for structures with probable flood depths of 2 feet or less. "Cost-effective" means that the benefits of the action would equal or exceed the costs to implement the action. For this RLAA, a benefit is considered to be an avoided loss. The high value of property in Los Angeles County makes it unlikely that acquisition projects can be cost-effective.

6.2.2 Home Elevation

Sometimes dry or wet flood-proofing are not enough and greater measures must be taken. For example, if the floodwaters are too high for dry flood-proofing and the inhabited area is too low for wet flood-proofing, it may be necessary to raise the structure. Whenever the floor of a home is below the 100-year flood elevation, physically elevating the structure is often recommended as it is one of the most effective means to prevent flood damage. Financial assistance may be available for floodproofing. Los Angeles County requires all substantially improved residential buildings to have their lowest floor elevated 1 foot above the 100-year elevation. No basements are allowed in the flood hazard.

6.2.3 Dry Flood-Proofing

Dry flood-proofing consists of completely sealing around the exterior of the building so that water cannot enter the building (see Figure 6-1). Dry flood-proofing is not a good option for areas where floodwater is deep or flows quickly. The hydrostatic pressure and/or hydrodynamic force can structurally damage the building by causing the walls to collapse or causing the entire structure to float. However, in areas that have minimal velocity and low depth, dry flood-proofing can be a good option.

Source: FEMA P-312, June 30, 2014

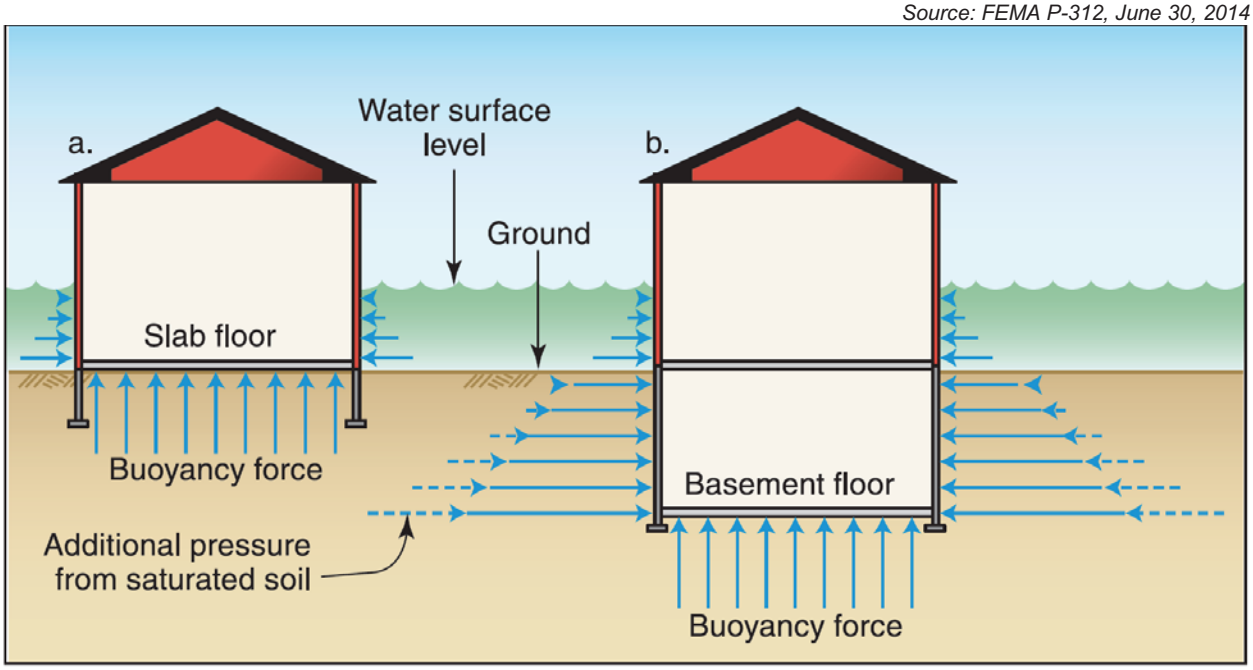


Figure 6-1. Dry Flood-Proofing Example

Many flood hazards can be mitigated with various forms of dry flood-proofing. Properties that do not have adequate protection of their low opening (window or basement door) can effectively raise the low opening height with a window well or a flood gate. The ultimate height of the low opening depends on several factors, such as: the level of flood protection desired, the appearance, and cost. The flood protection elevation could be set 1-foot higher than the existing low opening elevation, or it could be set to match the elevation of the lowest opening into a home that cannot be raised. This might be the elevation of the threshold of a door, for example.

The NFIP only allows dry flood-proofing for residential retrofits that are not classified as a substantial improvement. A substantial improvement is any reconstruction, rehabilitation, addition, or other

improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the "start of construction" of the improvement.

6.2.4 Wet Flood-Proofing

Wet flood-proofing consists of modifying uninhabited portions of a home, such as a crawlspace, garage, or unfinished basement with flood-damage resistant materials, to allow floodwaters to enter the structure without causing damage (see Figure 6-2). Wet flood-proofing requires portions of the building to be cleared of valuable items and mechanical utilities. A key component of wet flood-proofing is providing openings large enough for the water to flow through the structure such that the elevation of the water in the structure is equal to the elevation of the water outside of the structure. This equilibrium of floodwater prevents hydrostatic pressure from damaging structural walls.

6.2.5 Direct Drainage Away from the Building

In some cases, there are things that the property owner can do on-site such as directing shallow floodwater away from a flood-prone structure. Shallow flooding can often be kept away from a structure if some simple improvements are made to the yard. Sometimes structures are built at the bottom of a hill or in a natural drainage way or storage area, so that water naturally flows toward them.

One solution is to regrade the yard. If water flows toward the building; a new swale or wall can direct the flow to the street or a drainage way. Filling and grading next to the building can also direct shallow flooding away. Although water may remain in the yard temporarily, it is kept away from the structure. When these types of drainage modifications are made, care must be taken not to adversely affect the drainage patterns of adjacent properties. Over time, the swales along the lot lines or in the back yard may get filled in. Property owners build fences, garages, sheds, swimming pools, and other obstructions up to the lot line. These drainage problems can be fixed by removing the obstructions and restoring the swales so they will carry water away from the building.

6.2.6 Drainage Maintenance

Dumping into the drainage system is a Los Angeles County Code violation. Debris can accumulate and restrict the flow of stormwater, increasing the potential of localized flooding. To report flood problems or illegal dumping to the drainage system, call 800-675-HELP (4357).

6.2.7 Sewer Improvements

Heavy rains can saturate the soil and infiltrate the sanitary sewer system through leaky joints or cracks in the pipes. The inflow of stormwater floods the sanitary sewer system causing water to back-up into the home through lower level plumbing fixtures. This occurrence can be prevented by installing a sewer backflow preventer (see Figure 6-3). A backflow preventer will allow the sanitary sewer water to flow freely from the home to the sewer, but restrict the reverse flow. Backflow preventers do require maintenance and can fail if debris in the sewer prevents the valve seating properly. An overhead sewer system pumps wastewater from basement level plumbing fixtures up to an elevation near the ground level, where it can drain by gravity into the sewer service line. This higher sewer makes it unlikely that water will back-up into the building.

Source: FEMA P-312, June 30, 2014

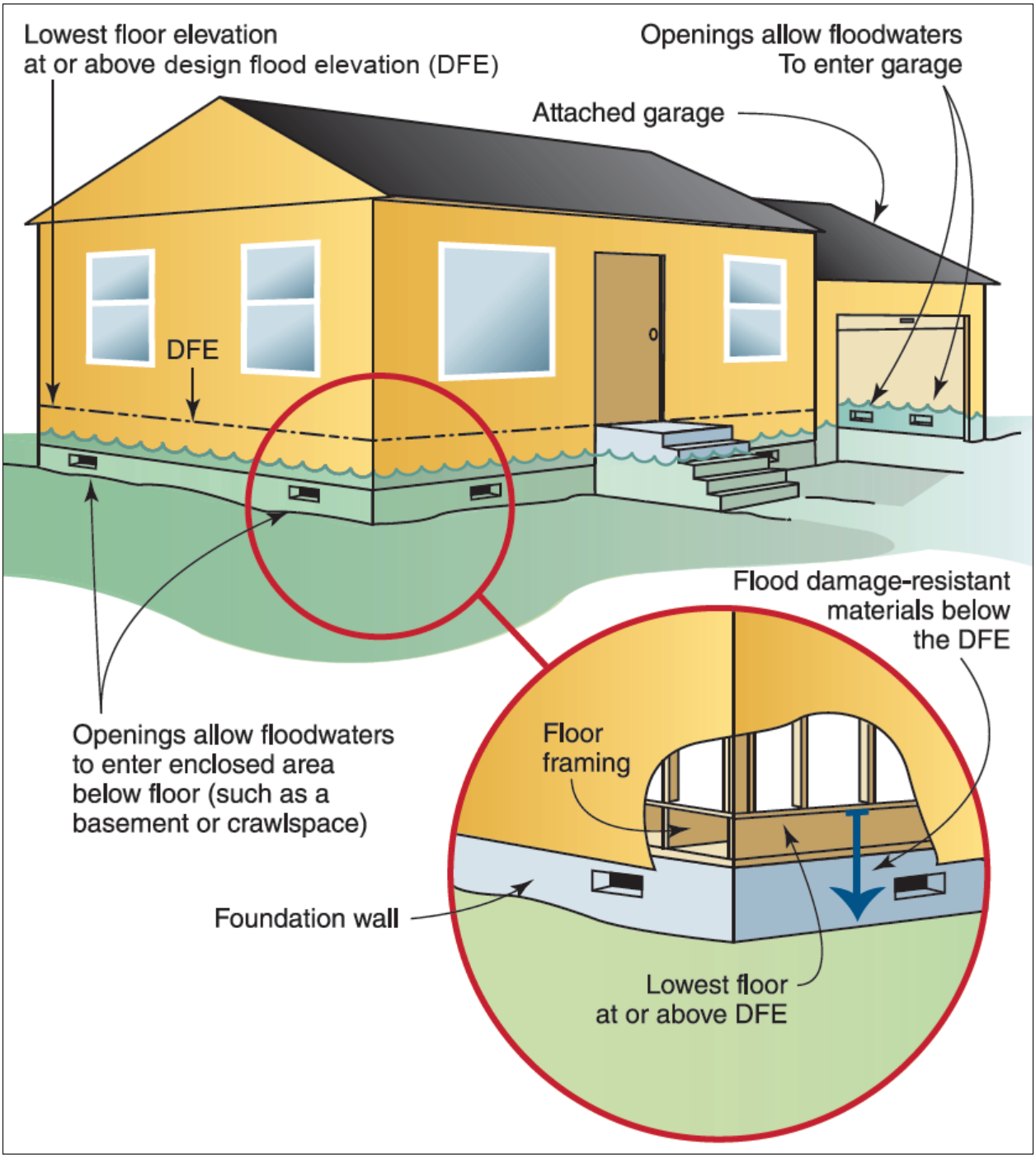


Figure 6-2. Wet Flood-Proofing Example

Source: FEMA P-312, June 30, 2014

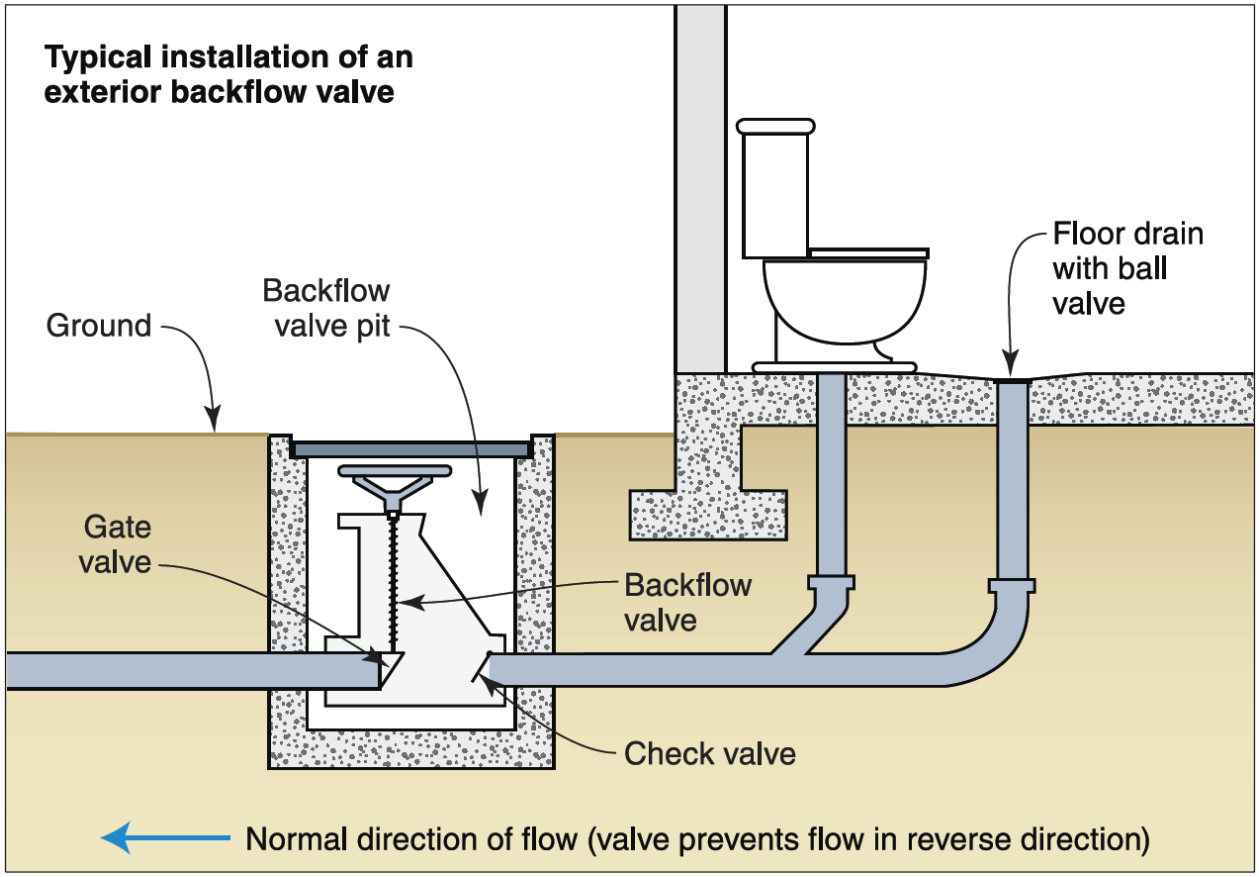


Figure 6-3. Sewer Backflow Valve Installation Example

6.2.8 Temporary Barriers

Several types of temporary barriers are available to address typical flooding problems. They work to direct drainage away from structures with the same principles as permanent barriers such as floodwalls or levees, but can be removed, stored, and reused in subsequent flood events.

6.3 NATURAL RESOURCE PROTECTION

Care should be taken to maintain the streams, wetlands and other natural resources within a floodplain or repetitive loss area. Removing debris from streams and channels prevents obstructions. Preserving and restoring natural areas provides flood protection, preserves water quality and provides natural habitat.

6.4 EMERGENCY SERVICES

Advance identification of an impending storm is only the first part of an effective Flood Warning and Response Plan. To truly realize the benefit of an early flood warning system, the warning must be disseminated quickly to floodplain occupants, repetitive loss areas and critical facilities. Appropriate response activities must then be implemented, such as: road closures, directing evacuations, sandbagging, and moving building contents above flood levels. Finally, a community should take measures to protect public health and safety and facilitate recovery. These measures may include: cleaning up debris and garbage, clearing streets, and ensuring that that citizens have shelter, food, and safe drinking water.

6.5 STRUCTURAL PROJECTS

Structural projects keep floodwaters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff. The Los Angeles County Department of Public Works develops and implements capital projects. The 2035 General Plan Implementation Program identifies a goal project of the Department of Regional Planning and the Department of Public Works jointly securing funding and setting priorities to prepare capital improvement plans for the County's 11 planning areas.

6.6 PUBLIC INFORMATION

One of the most important, and often overlooked, aspects of mitigation is public awareness. Awareness starts with recognition of the flood risk. FIRM panels, which designate areas of a community according to various levels of flood risk, can be viewed at www.FEMA.gov. Also, real estate transactions require disclosure of known flood hazards. The next level of awareness is related to hazard mitigation measures. Often homeowners can greatly reduce their risks with mitigation efforts if they are aware of the risks.. For that reason, as part of this analysis, every resident in the repetitive loss area has been contacted and informed of the opportunity to review this Report. In addition, the Los Angeles County Department of Public Works sends out an annual outreach letter to every resident in each repetitive loss area.

Los Angeles County has defined a program for public information (PPI) as part of its 2015 Comprehensive Floodplain Management Plan. This PPI includes a strategy for providing important information about property protection to property owners in the repetitive loss areas identified under this RLAA.

Part 2 —
Analysis of Individual Repetitive Loss Areas

CHAPTER 7.
AGUA DULCE REPETITIVE LOSS AREA

7.1 PROBLEM STATEMENT

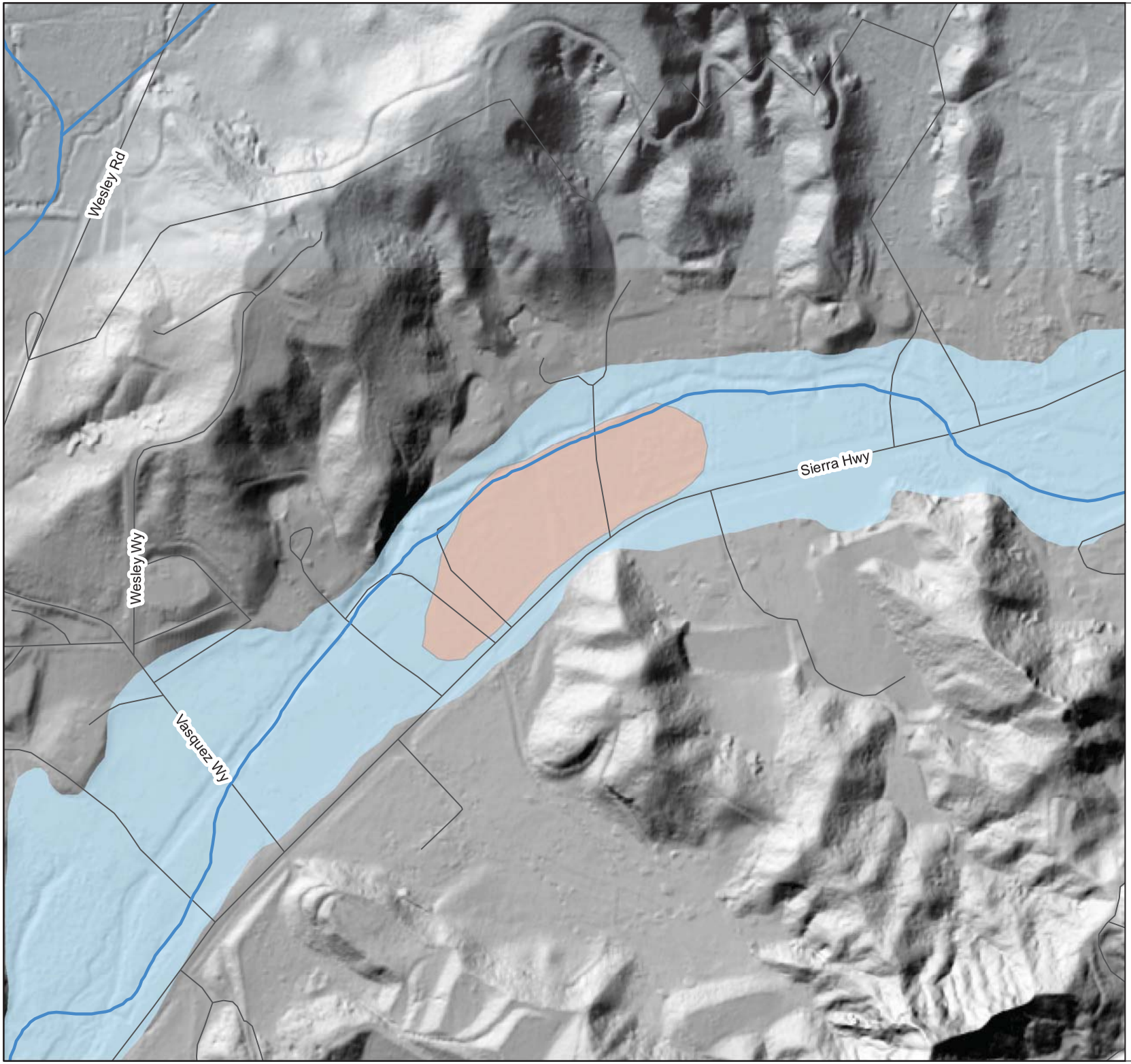
Figure 7-1 shows the Agua Dulce Repetitive Loss Area. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. This repetitive loss area is in the San Gabriel Mountains, east of Santa Clarita. The targeted repetitive loss property for this area is located within the floodplain of Mint Canyon. The property is in Zone A, which has significant risk from a 100-year flood. The culvert under Sierra Highway at approximately 250 feet upstream from the repetitive loss property is subject to becoming obstructed by debris from upstream. When runoff exceeds the capacity of the culvert, street flooding occurs and the subject property is subject to inundation. In addition, the property owner claimed the upstream neighbor improperly altered the natural creek and encroached on the floodplain and caused flow breakout from the channel. Mint Canyon borders the repetitive loss property, eroding and flooding its backyard. The property owner placed the log retaining walls around the street side property entrance. The County also built a berm on top of the channel bank near the culvert under the Sierra Highway in an effort to contain the water inside the channel.

7.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 7-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 7-1.
REPETITIVE LOSS PROPERTIES IN AGUA DULCE REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0091339	37	2/93, 2/98	$13,903	No
Identified Flood Cause: Property is located in the floodplain. Repetitive flooding possibly caused by street flooding when storm flows exceed the capacity of an upstream culvert. No reported losses since 1998.				



Agua Dulce Repetitive Loss Area

Figure 7-1

Final Mapped Repetitive Loss Area

FEMA Flood Hazard Area

Incorporated Areas

Note: Mapped Repetitive Loss Areas are approximate.

Base Map Data Sources: Los Angeles County, ESRI

COUNTY OF LOS ANGELES CALIFORNIA

TETRA TECH

N

0 0.05 0.1 Miles

7.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

The RL Map #37 property is the only property included in this repetitive loss area. It has two insurable buildings. Table 7-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 7-2.
ALL PROPERTIES IN AGUA DULCE REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
AD1	2	Slab, Crawlspace	Good	Enlarge culvert Drainage system maintenance Acquisition Elevation Public education
Total	**2**			

CHAPTER 8.
ALTADENA A REPETITIVE LOSS AREA

8.1 PROBLEM STATEMENT

Figure 8-1 shows the Altadena A Repetitive Loss Area. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. This area is located in the San Gabriel Mountains, east of Burbank near Altadena. The target repetitive loss property for this area is located at the bottom of the hill and possibly impacted by the storm runoffs from surrounding hills. There is a 2-foot-wide and 1-foot-deep dry earthen ditch running west of but outside of the property. The property is located at higher grounds compared to the bank elevations of the ditch. Repetitive flood history for this area appears to be isolated to the single RL property and can be associated with post-wildfire conditions.

8.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 8-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 8-1.
REPETITIVE LOSS PROPERTIES IN ALTADENA A REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0056933	35	2/91, 2/92	$2,725	No
Identified Flood Cause: Hillside drainage problem.				

8.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

The RL Map #35 property is the only property included in this repetitive loss area. It has one insurable building. Table 8-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 8-2.
ALL PROPERTIES IN ALTADENA A REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ALT-A1	1	Crawlspace	Good; Hillside problem, possibly with grading/drainage and retaining wall at the toe	Construct terrace drain and plant slope to reduce erosion Public education
Total	**1**			

ALTADENA A REPETITIVE LOSS AREA

Description: This area is located in the San Gabriel Mountains, east of Burbank near Altadena. There is a single-building repetitive loss area on Alzada Dr.

CHAPTER 9.
ALTADENA B REPETITIVE LOSS AREA

9.1 PROBLEM STATEMENT

Figure 9-1 shows the Altadena B Repetitive Loss Area. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. This area is in the San Gabriel Mountains, east of Burbank near Altadena. The target repetitive loss property for this area is located adjacent to a private, unmapped channel within a private residential community. Repetitive flood history for this area appears to be isolated to the single RL property and can be associated with post-wildfire conditions.

9.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 9-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 9-1.
REPETITIVE LOSS PROPERTIES IN ALTADENA B REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0091348	36	3/95, 2/98	$4,321	Yes*
Identified Flood Cause: Property is located near the privately constructed channel within the private hillside residential community. According to property owner who resides in the community, the channel has a concrete bottom but is not engineered. After the brush fire in 1993, the hillside storm runoff in the channel destroyed the private studio in the floodplain and eroded the bank protections, which were restored and improved later. In a separate incident, the basement was flooded due to a backyard drainage deficiency, which was improved with a 6-inch berm.				

***Note: an AW-501 has been submitted for this property, but correction was not yet approved as of this RLAA. Area will be removed from RLAA once correction is processed by FEMA.**

ALTADENA B REPETITIVE LOSS AREA

Description: This area is located in the San Gabriel Mountains, east of Burbank near Altadena. There is a single-building repetitive loss area on Hollyslope Rd.

9.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

The RL Map #36 property is the only property included in this repetitive loss area. It has one insurable building. Table 9-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 9-2.
ALL PROPERTIES IN ALTADENA B REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ALT-B1	1	Crawlspace	Good	Private channel maintenance Establish post-fire protocols Public education
Total	**1**			

CHAPTER 10.
CALABASAS A REPETITIVE LOSS AREA

10.1 PROBLEM STATEMENT

Figure 10-1 shows the Calabasas A Repetitive Loss Area. This area is in the Santa Monica Mountains in the northwestern portion of Los Angeles County. This area is a camping ground owned by the University of Pepperdine and located at the bottom of a hillside area. The steep hill at the west corner, or the highest point of the property, was prone to mudflow from the hill whenever it rains. The flow then runs along the private road across the camping ground between the camp housing facilities to the natural creek located at the east property boundary. Currently, the owner placed sandbags in some locations to temporarily protect the housing facilities near the bottom of the hill. The owner claimed that the sandbags were strategically placed to protect the housing facilities, and if the pattern of hillside runoff changes as it did in 1996 after the brush fire, his property would again be at the risk. The subject property is not located in or near a FEMA mapped floodplain. This repetitive flooding problem appears to be isolated to the subject property.

10.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 10-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 10-1.
REPETITIVE LOSS PROPERTIES IN CALABASAS A REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0072498	26	2/92, 1/95, 1/95, 2/98	$6,436	No
Identified Flood Cause: Mudflow from the hillside at the east end of the property and along the private road within the property.				

CALABASAS A REPETITIVE LOSS AREA

Description: This area is in the Santa Monica Mountains in the Northwestern portion of Los Angeles County. There is a single-building repetitive loss area on Las Virgenes Canyon Rd.

10.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

The RL Map #26 property is the only property included in this repetitive loss area. It has one insurable building. Table 10-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 10-2.
ALL PROPERTIES IN CALABASAS A REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
CA-A1	1	Slab	Good	Drainage improvement Drainage system maintenance Public education
Total	**1**			

CHAPTER 11.
CALABASAS B REPETITIVE LOSS AREA

11.1 PROBLEM STATEMENT

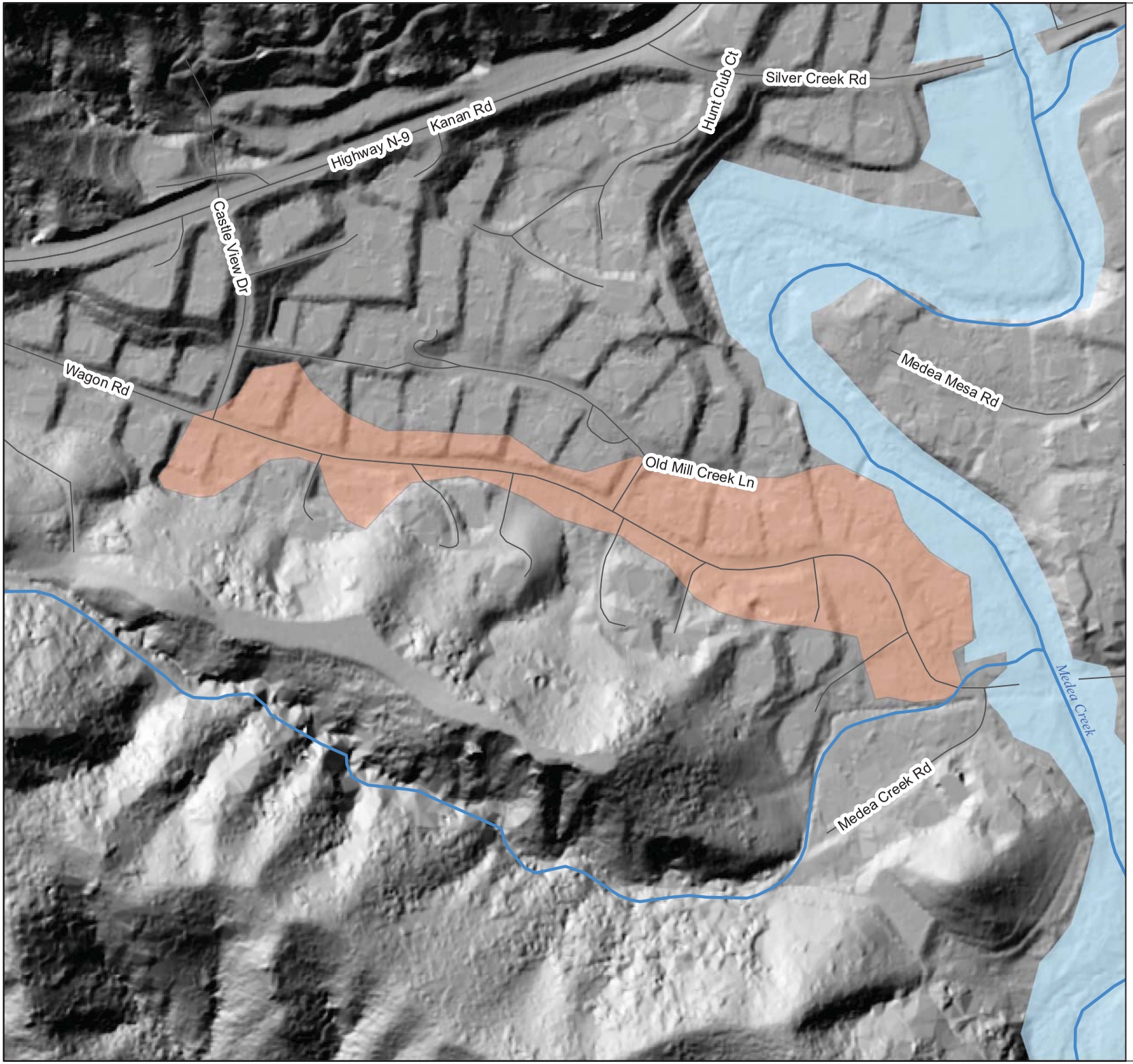
Figure 11-1 shows the Calabasas B Repetitive Loss Area. This area is in the Santa Monica Mountains in the northwestern portion of Los Angeles County. The flooding on RL Map 41 appears to be associated with urban drainage issues associated with runoff from streets as well as grading issues from property to property. The RL property for this area is located at the low point of the street and flows entering the front yard can be trapped and cause damage to the house, including foundation cracks.

11.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 11-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 11-1.
REPETITIVE LOSS PROPERTIES IN CALABASAS B REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0136718	41	2/98, 12/04	$4,105	No
Identified Flood Cause: The subject property is located adjacent to a higher neighboring property and receives runoff that can seep into the house. A former problem is that runoff from the roof enters planters in front of the house. The owner has installed pipes and drains in the planters to evacuate the water from the planters. Street level is higher than the subject property, potentially creating a condition where runoff could enter from the street. However, the owner indicated that an existing storm drain adequately captures flows from the street.				



Calabasas B Repetitive Loss Area

Figure 11-1

Final Mapped Repetitive Loss Area

FEMA Flood Hazard Area

Incorporated Areas

Note: Mapped Repetitive Loss Areas are approximate.

Base Map Data Sources: Los Angeles County, ESRI

COUNTY OF LOS ANGELES CALIFORNIA

TETRA TECH

N

0 0.05 0.1 Miles

11.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Sixteen properties with 16 insurable buildings have been identified in this repetitive loss area. Table 11-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 11-2.
ALL PROPERTIES IN CALABASAS B REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
CA-B1	1	Crawlspace	Good	Construct a berm to prevent off-site flows from entering the property. Provide grading and drainage to avoid water impoundment near the structure. Convert planter to pavement near the problem area. Continue to inspect the foundation for cracks and repair.
CA-B2	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B3	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B4	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B5	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B6	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B7	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B8	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B9	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B10	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B11	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B12	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B13	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B14	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B15	1	Crawlspace	Good	Drainage system maintenance Public education
CA-B16	1	Crawlspace	Good	Drainage system maintenance Public education
Total	**16**			

CHAPTER 12.
COLD CREEK REPETITIVE LOSS AREA

12.1 PROBLEM STATEMENT

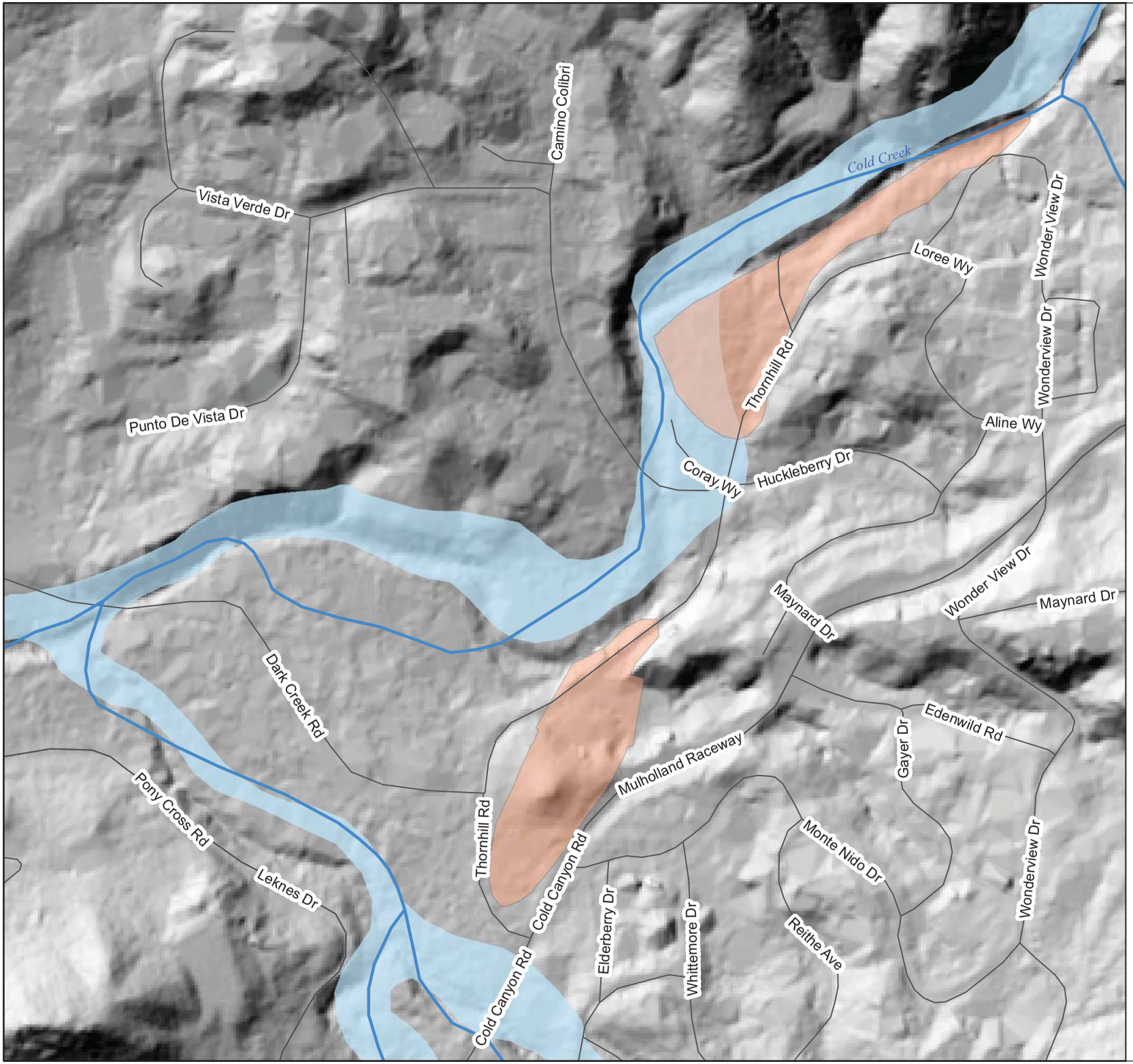
Figure 12-1 shows the Cold Creek Repetitive Loss Area, which includes RL Map 27 and RL Map 45. This area is in the Santa Monica Mountains in the northwestern portion of Los Angeles County. While none of the repetitive loss properties are located within a FEMA mapped floodplain, the delineated repetitive loss areas do parallel an approximate Zone A area mapped along Cold Creek. There is significant topographic relief in both of these areas. The cause of repetitive flooding in both these areas is associated with the blockage or obstruction of contributory drainages to Cold Creek off the hillside areas. Drainage ways and flow paths can become blocked by debris (downed trees and shrubs, leaves, sediment, and trash) collected by overland flows. When the drainages are blocked, stormwater flows overland to the streets, where there are few if any drainage conveyances. The target properties in the Cold Creek Repetitive Loss Area are topographically subject to flooding when these situations occur due to their locations below roadways.

12.2 IDENTIFIED REPETITIVE LOSS PROPERTIES

Table 12-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

TABLE 12-1.
REPETITIVE LOSS PROPERTIES IN COLD CREEK REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
#0071255	27	02/92, 01/93	$23,983	No
Identified Flood Cause: Is located at the high grounds and flooded by the excessive storm runoff from surrounding hills. It was also determined from the FEMA FIRM in Figure 12-1 that the property was not in the floodplain of Cold Canyon, adjacent to the property. No flooding activity since 1992.				
#0148768	45	12/04, 2/05	$8,062	No
Identified Flood Cause: Property is lower than the adjacent street, where flows concentrate during a rainstorm. The property is adjacent to the Cold Creek (Zone X (shaded) in FIRM); however, the owner claimed that no issues were caused by creek flows. The owner claimed that he has provided sufficient catch basins to handle the flows. Without proper diversion and control of runoff from the streets, future flood damage may occur.				



Cold Creek Repetitive Loss Area

Figure 12-1

- Final Mapped Repetitive Loss Area
- FEMA Flood Hazard Area
- Incorporated Areas

Note: Mapped Repetitive Loss Areas are approximate.

Base Map Data Sources: Los Angeles County, ESRI

COUNTY OF LOS ANGELES CALIFORNIA

TETRA TECH

N

0 0.03 0.06 Miles

12.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Nine properties with nine insurable buildings have been identified in this repetitive loss area. Table 12-2 and Table 12-3 provide general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 12-2.
ALL PROPERTIES IN COLD CREEK REPETITIVE LOSS AREA AROUND RL MAP 27

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
CO1	1	Slab/ Crawlspace	Good	Public education Local drainage improvements Drainage maintenance
CO2	1	Crawlspace	Good	Public education Local drainage improvements Drainage maintenance
Total	**2**			

TABLE 12-3.
ALL PROPERTIES IN COLD CREEK REPETITIVE LOSS AREA AROUND RL MAP 45

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
CO3	1	Crawlspace	Good	Public education Local drainage improvements Drainage maintenance
CO4	1	Crawlspace	Good	Public education Local drainage improvements Drainage maintenance
CO5	1	Crawlspace	Good	Public education Local drainage improvements Drainage maintenance
CO6	1	Slab	Good	Public education Local drainage improvements Drainage maintenance
CO7	1	Slab	Good	Public education Local drainage improvements Drainage maintenance
CO8	1	Crawlspace	Good	Public education Local drainage improvements Drainage maintenance
CO9	1	Slab	Good	Public education Local drainage improvements Drainage maintenance
Total	**7**			

CHAPTER 13.
DEL SUR REPETITIVE LOSS AREA

13.1 PROBLEM STATEMENT

Figure 13-1 shows the Del Sur Repetitive Loss Area. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. RL Map 55 is within a FEMA-designated 100-year floodplain, and the dates of loss for the claims on the property coincide with presidentially declared flood events. No other loss history suggests any flooding of this area other than from the riverine overbank flooding reflected in the FEMA flood maps. The properties identified for this area analysis were selected due to their proximity to the stream.

13.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 13-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 13-1.
REPETITIVE LOSS PROPERTIES IN DEL SUR REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
#0138781	55	1/05, 2/05	$14,034	No
Identified Flood Cause: *This property is located within a FEMA designated 100-year floodplain and the dates of loss for the 2 claims coincide with significant flood events within LA county that received presidential disaster declarations (DR-1577 and DR-1585). The cause of flooding for this area is commensurate with the flood risk reflected on the FEMA Flood Insurance Rate Map for this area*				

Del Sur Repetitive Loss Area

Figure13-1

Final Mapped Repetitive Loss Area

FEMA Flood Hazard Area

Incorporated Areas

Note: Mapped Repetitive Loss Areas are approximate.

Base Map Data Sources: Los Angeles County, ESRI

COUNTY OF LOS ANGELES CALIFORNIA

TETRA TECH

N

0 0.075 0.15 Miles

13.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Three properties with three insurable buildings have been identified in this repetitive loss area. Table 13-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 13-2.
ALL PROPERTIES IN DEL SUR REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
DS1	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
DS2	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
DS3	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
Total	**3**			

CHAPTER 14.
LOWER TOPANGA CANYON REPETITIVE LOSS AREA

14.1 PROBLEM STATEMENT

The Lower Topanga Canyon Repetitive Loss Area includes RL Map 19, 20, 21, 22 and 23. These areas are in the Topanga Canyon area of Los Angeles County, about 26 miles northwest of the City of Los Angeles. All of the areas located along the lower reach of the Topanga Canyon channel (sometimes referred to as the Rodeo Grounds area) were frequently inundated by the Topanga Canyon flood flows. These properties are practically located within the lower reach of Topanga Canyon with ground elevation similar to the channel invert (i.e. lowest elevation of the channel). This information was derived from analysis of the topographic data as described in Chapter 2. Rodeo Grounds Road is higher than the invert; however, the berm is not sufficient to confine the floodwater and the Rodeo Grounds low-lying areas have been subject to severe flood damage. Previous insurance claims were filed by the property residents who leased the properties from Los Angeles Athletic Club Company, Inc.

14.2 IDENTIFIED REPETITIVE LOSS PROPERTIES

Table 14-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

TABLE 14-1.
REPETITIVE LOSS PROPERTIES IN LOWER TOPANGA CANYON REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0014900	19	3/78, 2/80	$9,171	Yes
Identified Flood Cause: Property in the channel and in Flood Zone AE of Lower Topanga Canyon				
0017941	20	1/78, 2/80, 1/83	$9,446	Yes
Identified Flood Cause: Property in the channel and in Flood Zone AE of Lower Topanga Canyon				
0017942	21	1/78, 1/80, 2/80, 1/83, 2/92, 1/95	$10,063	Yes
Identified Flood Cause: Property in the channel and in Flood Zone AE of Lower Topanga Canyon				
0028440	22	1/78, 3/78	$8,805	Yes
Identified Flood Cause: Property in the channel and in Flood Zone AE of Lower Topanga Canyon				
0017940	23	1/78, 3/78, 2/80	$3,999	Yes
Identified Flood Cause: Property in the channel and in Flood Zone AE of Lower Topanga Canyon				

14.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

The identified five RL map properties are the only properties in this repetitive loss area. The secondary analysis for this area determined that there are no longer structures on any of the properties. The County will need to submit new AW-501s for this area. Until these correction can be made, this area will remain in this RLAA, however no additional properties are identified.

CHAPTER 15.
MALIBOU LAKE REPETITIVE LOSS AREA

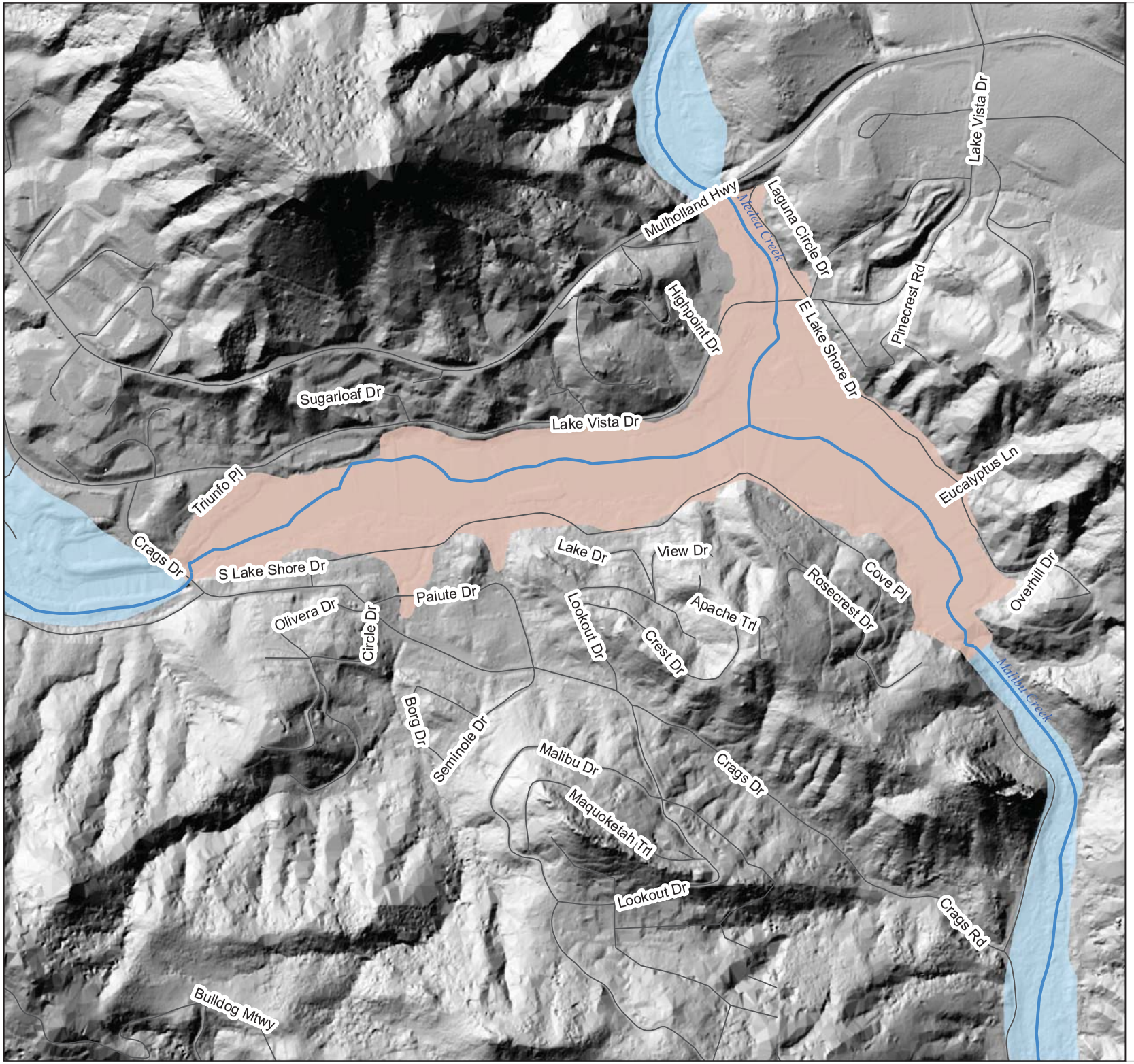
15.1 PROBLEM STATEMENT

Figure 15-1 shows the Malibou Lake repetitive loss area. This area includes 20 identified repetitive loss properties, 4 of which have been mitigated and 16 of which are unmitigated. Malibou Lake is, a privately owned and operated reservoir located in the western area of Los Angeles County near the Ventura County/Los Angeles County line. The contributing watershed starts in Ventura Hidden Valley in Ventura County, approximately 10 miles northwest of Malibou Lake. Stormwater runoff enters the ungated Lake Sherwood and flows through Potrero Valley Creek, Westlake Lake, Triunfo Canyon Creek, and empties into Malibou Lake. Westlake Lake is 4.7 miles northwest of Malibou Lake and is in both Ventura and Los Angeles County. Malibou Lake also receives runoff from Medea Creek, a major tributary north of the lake. The total drainage area at the spillway of Malibou Lake is 64 square miles.

The lake has a surface area of approximately 20 acres at spillway elevation. The contributory watershed covers portion of Ventura County and Los Angeles County and crosses three city boundaries; Thousand Oaks, Agoura Hills, and Westlake Village.

Most of the repetitive loss properties in this area are damaged by rising water of Malibou Lake during flood events. Malibou Lake lies at the confluence of Triunfo Canyon and Medea Creek. The terrain in this area is steep and rocky, causing rainwater to concentrate at the lake quickly. In addition, upstream urbanization has a higher discharge at the lake for a given rainstorm event due to the increase in impervious surfaces. The existing lake has an estimated surface area of 20 acres and a storage volume of 250 acre-feet at the spillway elevation. The storage below the spillway is ineffective for peak flow attenuation during normal times since the water elevation is maintained at the spillway elevation at all times. During flood events, the lake is partially filled with sediments, reducing its recreational functions.

Those repetitive loss properties not located around the lake (RL Maps 2, 1, 8, 25 and 46) were damaged by other localized events. RL Map 2 is on high ground and was flooded by runoff for surrounding hillsides. RL Map 18 was damaged by floodwater from Medea Creek. This could be attributed to backwater from Malibou Lake. RL Map 19 does reside in the Medea Creek floodplain. RL Map 25 was flooded by overflows from a storm drain ditch east of the property. RL Map 46 was damaged from storm flows entering the property from the street, which is at a higher elevation than the house.



Malibou Lake Repetitive Loss Area

Figure 15-1

Final Mapped Repetitive Loss Area

FEMA Flood Hazard Area

Incorporated Areas

Note: Mapped Repetitive Loss Areas are approximate.

Base Map Data Sources: Los Angeles County, ESRI

COUNTY OF LOS ANGELES CALIFORNIA

TETRA TECH

N

0 0.075 0.15 Miles

15.2 IDENTIFIED REPETITIVE LOSS PROPERTIES

Table 15-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

TABLE 15-1.
REPETITIVE LOSS PROPERTIES IN MALIBOU LAKE REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
#0046576	1	2/80, 3/83, 2/92, 2/93, 1/95, 3/95, 2/98	$6,716	No
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events				
#0047197	2	2/80, 3/83, 2/92	$5,538	No
Identified Flood Cause: Hillside, backyard drainage problem.				
#0001165	3	2/98, 1/01, 3/01, 2/03, 2/04, 1/05, 2/05, 1/08, 1/10	$11,674	No
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events				
#0039962	4	2/80, 2/92, 3/95, 2/98	$2,859	No
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events				
#0028487	5	3/78, 2/80	$9,398	No
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events				
#0040087	6	2/80, 3/83	$15,836	No
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events				
#0012820	7	2/92, 2/93, 1/95, 2/98, 3/01, 12/04, 1/05	$57,493	No
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events				
#0049496	8	3/83, 2/92, 1/95, 2/98	$9,792	No
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events				
#0028444	10	3/78, 2/80, 1/83, 3/83, 1/95, 3/95, 2/98	$15,858	Yes
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events. Structure has been elevated, confirmed by site visit. Property no longer subject to repetitive flooding				
#0071413	11	2/92, 1/95, 3/95	$16,264	Yes
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events. The home was elevated above the Los Angeles County capital flood elevation (736.18 feet) in 2002.				
#0073653	12	2/92, 1/95	$65,231	No
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events.				
#0072406	13	2/93, 1/95	$4,391	No
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events.				
#0071417	14	2/92, 1/95, 2/98, 2/01	$3,660	No
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events.				
#0035727	15	2/80, 1/83, 3/83, 2/92, 1/95, 2/98	$25,272	No
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events.				

TABLE 15-1.
REPETITIVE LOSS PROPERTIES IN MALIBOU LAKE REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
#0052974	16	2/80, 1/83, 3/83, 2/92, 1/95, 3/95, 2/98, 1/05	$12,979	Yes
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events. 10-years since last claim. Property appears to have been mitigated based on comparison of photos from 2009 plan and photos taken during site visit in 2015. Crawlspace foundation with finished floor approximately 36 inches above adjacent grade. Property no-longer considered subject to repetitive flooding.				
#0093872	17	1/95, 2/98	$5,895	No
Identified Flood Cause: Inundated by rising waters of Malibou Lake during repetitive storm events. Over 15 years since last flood claim. Crawlspace foundation with finished floor approximately 42 inches above adjacent grade.				
#0057971	18	3/83, 2/92, 1/95	$9,150	No
Identified Flood Cause: Flood water from Medea Creek or backwater from Malibou Lake, or a combination of both. No flood claims since 1995.				
#0091232	25	2/98, 2/98, 1/05	$14,607	No
Identified Flood Cause: Capacity of storm drain culvert located near the property is undersized which causes overflows to the street and adjoining properties.				
#0137792	46	3/01, 1/05	$1,557	No
Identified Flood Cause: Property sits below street elevation. Stormwater flow from street can impact the home.				

15.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Fifty-six properties with 71 insurable buildings have been identified in this repetitive loss area. Table 15-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 15-2.
ALL PROPERTIES IN MALIBOU LAKE REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML1	1	Slab	Fair	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Public education
ML2	2	Slab	Good	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Public education
ML3	1	Crawlspace	Good	Elevation Flood-proofing Floodwall Public education
ML4	0	N/A	N/A	All structures removed
ML5	1	Slab	Good	Elevation Acquisition Flood-proofing Public education
ML6	2	Slab	Good	Elevation, Floodwall Flood-proofing Public education
ML7	1	Slab	Good	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Flood-proofing Public education
ML8	1	Slab	Fair	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Flood-proofing Public education
ML9	1	Slab	Fair	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Flood-proofing Public education

TABLE 15-2.
ALL PROPERTIES IN MALIBOU LAKE REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML10	1	Slab	Good	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Public education
ML11	1	Piers	Good; Structure appears to be elevated to post and pier foundation with no enclosures; elevation unknown	Public Education
ML12	1	Slab	Fair	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Public education
ML13	1	Crawlspace	Good	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Public education
ML14	1	Slab	Fair	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Public education
ML15	1	Crawlspace	Fair	Elevation Acquisition Public education
ML16	1	Crawlspace	Good	Confine upstream inflow Upsize the pipe opening Improve storm drain Add a truss-rack at the inlet Public education
ML17	1	Crawlspace	Good	Elevation Acquisition Public education
ML18	1	Crawlspace	Fair	Install perimeter diversion ditches, walls, and berms to prevent street runoff entering the property Raise and pave planting areas with ditches to drain, Build a cutoff wall to keep storm runoff from street flows away from the structure. Provide a ditch crossing the driveway to divert flows away from the structure Build cutoff wall to prevent seepage Public education
ML19	1	Slab	Good	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Public education

TABLE 15-2.
ALL PROPERTIES IN MALIBOU LAKE REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML20	1	Slab	Good	Maintain drainage flow away from property Public education
ML21	1	Slab	Fair	Maintain drainage flow away from property Public education
ML22	1	Crawlspace	Good; Substantial remodel, located on hillside above lake—detached garage at road level	Flood-proofing of the garage Public education
ML23	2	Slab	Good; Boat house on lake and basement garage most susceptible	Flood-proofing Public education
ML24	2	Slab	Good; Boat house on lake and basement garage most susceptible	Flood-proofing Public education
ML25	2	Slab	Good; Boat house on lake and basement garage most susceptible	Flood-proofing Public education
ML26	2	Slab	Good; Two structures on property—main house and a boat house	Public education for whole property Flood-proofing for the boat house For the main house: Flood-proofing Abandon lowest floor Elevation Acquisition
ML27	2	Slab	Good; Two structures on property—main house and a boat house; lower level of main house is a garage susceptible to flood levels	Flood-proofing Public education
ML28	2	Slab	Good; Boat house on lake most susceptible	Flood-proofing Public Education
ML29	2	Slab	Good; Boat house on lake most susceptible	Flood-proofing Public Education
ML30	2	Slab	Good; Boat house on lake most susceptible	Flood-proofing Public Education

TABLE 15-2.
ALL PROPERTIES IN MALIBOU LAKE REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML31	1	Slab	Fair	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Flood-proofing Floodwall Public education
ML32	1	Crawlspace	Good	Elevation, acquisition Flood-proofing Public education
ML33	1	Crawlspace	Fair	Flood-proofing Floodwall Public education
ML34	1	Slab	Good	Floodwall Flood-proofing Public Education
ML35	2	Slab	Good; The source of the flooding is not the lake (due to the elevation of the structure), but the possibility of street flooding	Temporary barriers to protect doors, divert water around home, decrease water coming in from street/driveway Public education
ML36	1	Slab	Good; Two structures on property—main structure is in flood zone; second structure is outside flood zone and not subject to repetitive flooding	Mitigation measures for main structure: Acquisition Flood-proofing Floodwall Public education
ML37	1	Slab	Fair	Flood-proof basement garage Floodwall Public education
ML38	1	Slab	Fair	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Flood-proofing Public Education
ML39	2	Slab	Fair	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Flood-proofing Public education
ML40	2	Crawlspace	Fair	Elevation Acquisition Floodwall Public Education

TABLE 15-2.
ALL PROPERTIES IN MALIBOU LAKE REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML41	2	Crawlspace	Fair	Elevation Acquisition Floodwall Public Education
ML42	1	Crawlspace	Good	Elevation Acquisition Floodwall Public education
ML43	1	Slab	Good	Flood-proof basement garage Floodwall Public education
ML44	1	Crawlspace	Fair	Flood-proofing, Temporary barriers (sandbags and such other items) Public education
ML45	1	Slab	Good; New construction, properly elevated for the flood zone	Public Education
ML46	1	Slab	Good; Structure appears to be properly elevated; eligible for an AW-501	Public Education
ML47	1	Crawlspace	Good	Flood-proofing Public education
ML48	1	Slab	Good	Elevation Acquisition Floodwall Flood-proofing Public education
ML49	1	Crawlspace	Fair	Floodwall Flood-proofing Public Education
ML50	1	Crawlspace	Good	Flood-proofing Public education
ML51	2	Slab	Fair; Two structures on property, only one subject to flooding	Abandon lowest floor or convert to parking and storage Elevate lowest floor to above base flood elevation Acquisition Flood-proofing Public education
ML52	1	Crawlspace	Good; Structure appears to have been elevated	Public education
ML53	1	Slab	Newer construction; little risk	Public education

TABLE 15-2.
ALL PROPERTIES IN MALIBOU LAKE REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML54	1	Crawlspace	Good; New construction, properly elevated	Public education
ML55	2	Slab	Fair	Elevation Acquisition Floodwall Flood-proofing Public education
ML56	1	Slab	Good	Elevation Acquisition Floodwall Flood-proofing Public education
Total	**71**			

CHAPTER 16.
MALIBU REPETITIVE LOSS AREA

16.1 PROBLEM STATEMENT

Figure 16-1 shows the Malibu Repetitive Loss Area. This area is in the Santa Monica Mountains in the northwestern portion of Los Angeles County. The property is located at the lowest point of the street. The first floor of the house was built lower than the street level, and street runoff can enter the house through the driveway. An owner of this property built a 6-inch berm in front of the driveway to divert the water. This, however, may not have relieved the flood problem associated with major floods. The other properties in this area have similar circumstances, with the first floor of the house built below the street within a similar elevation contour. There is no mapped FEMA flood zone within this area.

16.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 16-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 16-1.
REPETITIVE LOSS PROPERTIES IN MALIBU REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0070079	28	2/92, 1/95, 3/98, 3/00	$5,524	No
Identified Flood Cause: House is located at the low point of the street.				

Malibu Repetitive Loss Area

Figure 16-1

Final Mapped Repetitive Loss Area

FEMA Flood Hazard Area

Incorporated Areas

Note: Mapped Repetitive Loss Areas are approximate.

Base Map Data Sources: Los Angeles County, ESRI

COUNTY OF LOS ANGELES CALIFORNIA

TETRA TECH

N

0 0.03 0.06 Miles

16.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Seven properties with seven insurable buildings have been identified in this repetitive loss area. Table 16-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 16-2.
ALL PROPERTIES IN MALIBU REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
MAL1	1	Crawlspace	Fair	Diversion Berm Street grading Public education
MAL2	1	Crawlspace	Good	Diversion Berm Street grading Public education
MAL3	1	Slab	Good	Diversion Berm Street grading Public education
MAL4	1	Slab	Good	Diversion Berm Street grading Public education
MAL5	1	Slab	Good	Diversion Berm Street grading Public education
MAL6	1	Slab	Good	Diversion Berm Street grading Public education
MAL7	1	Slab	Good	Diversion Berm Street grading Public education
Total	**7**			

CHAPTER 17.
QUARTZ HILL A REPETITIVE LOSS AREA

17.1 PROBLEM STATEMENT

Figure 17-1 shows the Quartz Hill A Repetitive Loss Area. This area is located in the Quartz Hill region of Los Angeles County. Quartz Hill, a 390-square-mile, high desert community, is located in the westernmost part of the Mojave Desert north of the San Gabriel Mountains. It is approximately 80 miles northwest of Palmdale and 55 miles southwest of Lancaster. Flood studies of the Quartz Hill area show that the identified RL property is located within Flood Hazard Zone X, an area of minimal flooding. The repetitive flooding this area is the overflow runoff from the detention basin, which has now been relocated, southeast of the identified RL property. This property is also possibly subject to the sheet-flow along the "Antelope Valley Drainage Corridor No. 9." According to the RL property owner, the property was flooded when the retention basin, located a couple of blocks to the south, could not hold the storm water, and the gate was forced to open. The overland runoff entered his property across empty lots, causing flooding at the property. The basin has been replaced by a golf course and relocated one half mile to the northwest, further downstream from the property, which eliminated further flooding problems. This is substantiated by the fact that there has been no subsequent flood damage to the property since the relocation of the retention basin. This is considered to be an isolated event, and no other properties were determined to be impacted. The County has submitted an AW-501 for this property. This property will be shown as "mitigated," and the area will be removed from obligation for annual repetitive loss mailing under the County's CRS program.

17.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 17-1 lists the FEMA-designated repetitive loss property within this repetitive loss area; which is being listed as "mitigated." No other properties are identified for this area.

TABLE 17-1.
REPETITIVE LOSS PROPERTIES IN QUARTZ HILL A REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0057385	38	1/92, 1/92, 2/92, 12/92	$15,228	Yes*

Identified Flood Cause: Overflow from detention basin, which has been relocated. Property no longer subject to repetitive flooding.

***Note:** An AW-501 has been submitted for this property, but correction was not yet approved as of this RLAA. Area will be removed from RLAA once correction is processed by FEMA.

17.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

The RL Map #38 property is the only property included in this repetitive loss area. It has one insurable building with a slab foundation that is in good condition. This property has been mitigated, so no new mitigation measures are recommended.

QUARTZ HILL A REPETITIVE LOSS AREA

Description: This area is in the Quartz Hill region of Los Angeles County. There is a single-building repetitive loss area on West Avenue N.

CHAPTER 18.
QUARTZ HILL B REPETITIVE LOSS AREA

18.1 PROBLEM STATEMENT

Figure 18-1 shows the Quartz Hill B Repetitive Loss Area, which includes RL Map 39 and RL Map 40. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. This area is located in the Quartz Hill region of Los Angeles County. Quartz Hill, a 390-square-mile, high desert community, is located in the westernmost part of the Mojave Desert north of the San Gabriel Mountains. It is approximately 80 miles northwest of Palmdale and 55 miles southwest of Lancaster.

None of the properties in this area are located within a FEMA-identified Special Flood Hazard Area. The flooding source for RL Map 39 is the street runoff that breaks out from Antelope Valley Drainage Corridor No. 7 (identified in the *Antelope Valley Comprehensive Plan of Flood Control and Water Conservation*; Los Angeles County, 1991) along 50th and 52nd streets. The other properties within this area are at ground elevations similar to that of the identified repetitive loss property and have lowest floors with similar elevations as well. RL Map 40 is located within an alluvial fan which contributes flows to the property via surrounding streets. This property is located at the low point of the street where flows can concentrate and enter the property. The other properties identified within this area have a topographic relationship with the identified repetitive loss property.

18.2 IDENTIFIED REPETITIVE LOSS PROPERTIES

Table 18-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

TABLE 18-1.
REPETITIVE LOSS PROPERTIES IN QUARTZ HILL B REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0091087	39	2/92, 12/97	$2,783	No
Identified Flood Cause: Property is located in Antelope Drainage Corridor. The sheet flow from Antelope Valley Drainage Corridor No.7 flooded the property, displacing retaining walls. The property currently has a private earthen ditch and small berms along it to route the water through the property boundaries.				
0131222	40	2/04, 10/04, 12/04, 1/05, 2/05	$6,186	No
Identified Flood Cause: The subject property is located within Flood Hazard Zone X (shaded) and is located in Antelope Drainage corridor. The property is subject to significant flooding. The corridor flows may be conveyed to this property through streets and low lying areas and trapped at the property (which is lower than the streets). The first floor elevation is also lower than the streets and has been damaged frequently by historical floods. The owner has constructed berms at the entry gate and prepared a pump pit. Without a comprehensive and reliable berm and on-site pump system, this property may continue to experience flood damage and submit future claims. In addition, the interior household flows are being discharged to the side yard, but should be disposed via a sanitary sewer or County-approved drywell.				

Quartz Hill B Repetitive Loss Area

Figure 18-1

Final Mapped Repetitive Loss Area

FEMA Flood Hazard Area

Incorporated Areas

Note: Mapped Repetitive Loss Areas are approximate.

Base Map Data Sources: Los Angeles County, ESRI

TETRA TECH

N

0 0.1 0.2 Miles

18.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Twenty-five properties with 26 insurable buildings have been identified in this repetitive loss area. Table 18-2 and Table 18-3 provide general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 18-2.
ALL PROPERTIES IN QUARTZ HILL B REPETITIVE LOSS AREA AROUND RL MAP 39

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
QH-B1	1	Slab	Good	Improve private ditch Construct an area-wide storm drain and flood retention system Public education
QH-B2	1	Slab	Good	Construct an area-wide storm drain and flood retention system Public education
QH-B3	1	Slab	Good	Construct an area-wide storm drain and flood retention system Public education
QH-B4	1	Slab	Good	Construct an area-wide storm drain and flood retention system Public education
QH-B5	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B6	2	Slab	Good	Construct an area-wide storm drain and flood retention system Public education
QH-B7	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B8	1	Slab	Good	Construct an area-wide storm drain and flood retention system Public education
QH-B9	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B10	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B11	1	Slab	Good	Construct an area-wide storm drain and flood retention system Public education
QH-B12	1	Slab	Good	Construct an area-wide storm drain and flood retention system Public education
QH-B13	1	Slab	Good	Construct an area-wide storm drain and flood retention system Public education
Total	**14**			

TABLE 18-3.
ALL PROPERTIES IN QUARTZ HILL B REPETITIVE LOSS AREA AROUND RL MAP 40

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
QH-B14	1	Slab	Fair	Stabilize the entry with rock or concrete blocks under the dirt. Install a permanent automatic control pump so that it activates if water reaches a predetermined level of 1 or 2 inches. Complete and raise the 1' high side wall Install a dry well with dimensions of 2' or 3' diameter, 10' or 15' depth to receive discharge. Connect the washer and bath flow to the dry well.
QH-B15	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B16	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B17	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B18	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B19	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B20	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B21	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B22	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B23	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B24	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
QH-B25	1	Slab	Fair	Construct an area-wide storm drain and flood retention system Public education
Total	**12**			

CHAPTER 19.
ROOSEVELT REPETITIVE LOSS AREA

19.1 PROBLEM STATEMENT

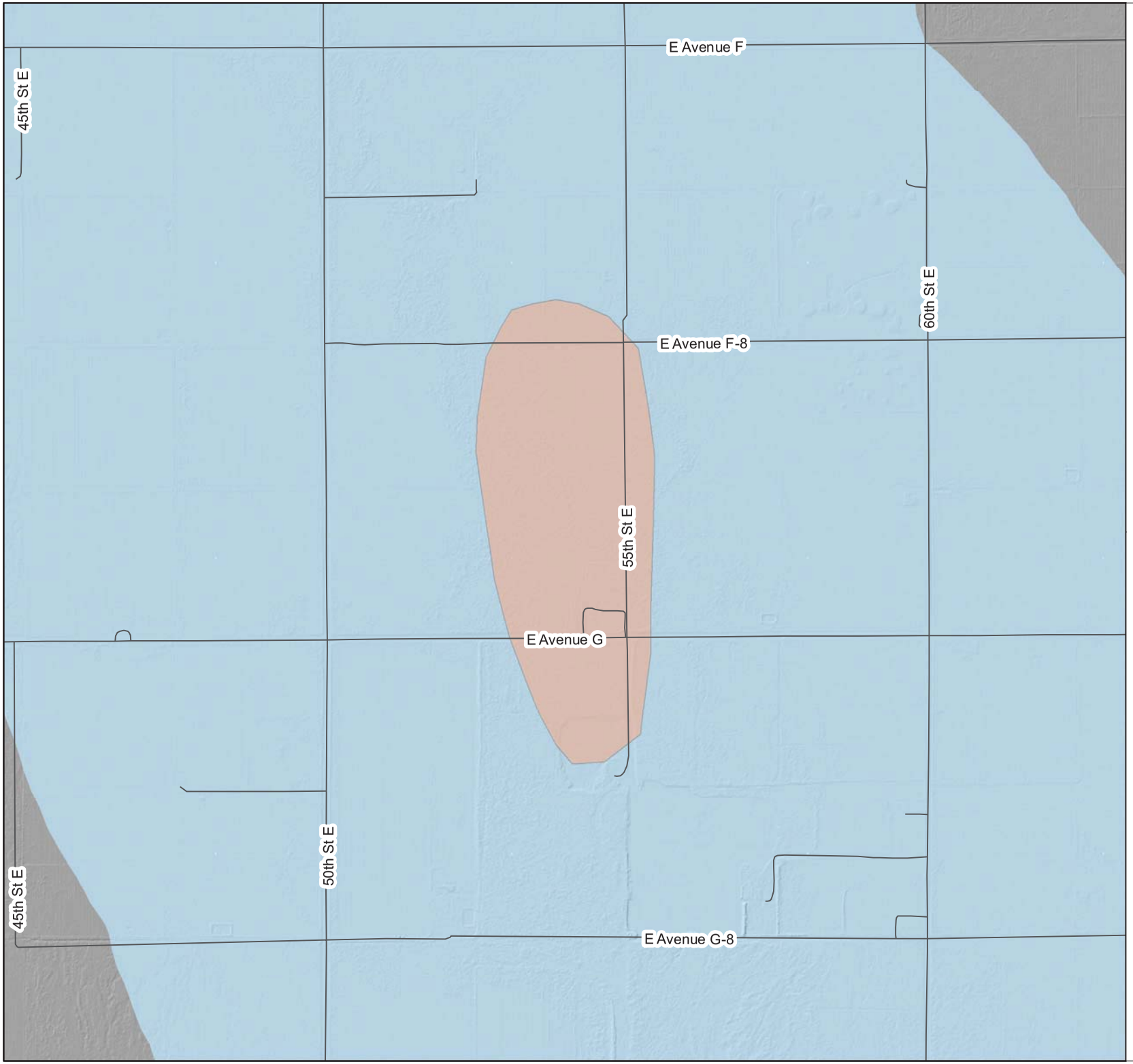
Figure 19-1 shows the Roosevelt Repetitive Loss Area. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. This area is within the floodplain of Little Red Rock Wash, in Lancaster. Lancaster is located approximately 70 miles north of the City of Los Angeles in Southern California's Antelope Valley. It is separated from the Los Angeles Basin by the San Gabriel Mountain Range to the south and from Bakersfield and the San Joaquin Valley by the Tehachapi Mountain Range to the north. Lancaster's elevation is 2,500 feet above sea level on a high, flat valley surrounded by mountain ranges. The subject property lies below adjacent grade and receives runoff from the higher adjacent grade during rain events.

19.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 19-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 19-1.
REPETITIVE LOSS PROPERTIES IN ROOSEVELT REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0137354	42	1/05, 2/05	$17,148	No
Identified Flood Cause: Property is located in Flood Hazard Zone A and in the floodplain of Little Red Rock Wash. The existing lot is lower than the adjacent grade and may receive runoff from adjacent properties during rain events.				



Roosevelt Repetitive Loss Area

Figure 19-1

Final Mapped Repetitive Loss Area

FEMA Flood Hazard Area

Incorporated Areas

Note: Mapped Repetitive Loss Areas are approximate.

Base Map Data Sources: Los Angeles County, ESRI

COUNTY OF LOS ANGELES CALIFORNIA

TETRA TECH

N

0 0.15 0.3 Miles

19.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Three properties with three insurable buildings have been identified in this repetitive loss area. Table 19-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 19-2.
ALL PROPERTIES IN ROOSEVELT REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ROO1	1	Slab	Good	Establish drainage flow paths around structure Elevation Drainage system maintenance Public education
ROO2	1	Slab	Good	Establish drainage flow paths around structure Elevation Drainage system maintenance Public education
ROO3	1	Slab	Good	Establish drainage flow paths around structure Elevation Drainage system maintenance Public education
Total	**3**			

CHAPTER 20.
ROWLAND HEIGHTS REPETITIVE LOSS AREA

20.1 PROBLEM STATEMENT

Figure 20-1 shows the Rowland Heights Repetitive Loss Area. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. This area is in Rowland Heights—about 9 square miles of unincorporated Los Angeles County near the boundaries of where the Los Angeles County, Orange County and San Bernardino County meet. The elevation is 540 feet above sea level. It is loosely bounded by the Puente Hills to the south and San Jose Hills to the north-northeast. The area is approximately 10 miles north of Anaheim and 34 miles east-southeast of Los Angeles. Flood studies of the Rowland Heights area show that RL Map 44 is located within Flood Hazard Zone X, an area of minimal flooding. RL Map 44 is a single dwelling within a hillside development generally situated high above the floodplain. It was observed that the possible flooding source is the storm and irrigation runoff from the adjoining property. The neighboring property to the east is much higher than the subject property. The property may receive significant excess runoff from the elevated neighboring property, especially during large storms. There is also a possibility of slope erosion due to the high and steep nature of the slope. The flooding problem seems to have been partially fixed with a small toe wall. However, a more comprehensive wall and drain system will be required to prevent future claims. This repetitive flooding problem is considered to be localized and isolated to the identified repetitive loss property. The fact that no subsequent claims have been filed in the last 10 years suggests that the problem has been rectified. No additional properties are identified for this area.

20.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 20-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 20-1.
REPETITIVE LOSS PROPERTIES IN ROWLAND HEIGHTS REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0138651	44	3/01, 2/05	$9,734	No
Identified Flood Cause: RL Map 44 is significantly lower in elevation than the neighboring property. Without insurance records, it seems that flows from the neighboring property to the side yard can be sufficient to cause damage. Additionally, the slope may be eroded and contribute debris. Street flows may tend to collect in front of the property before moving down the steep street. The finished floor elevation, however, seems to be high enough to prevent damage by street flow.				

ROWLAND HEIGHTS REPETITIVE LOSS AREA

Description: This area is in Rowland Heights, near the boundaries of where Los Angeles County, Orange County and San Bernardino County meet. There is a single-building repetitive loss area on Robert Rd.

20.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

The RL Map #44 property is the only property included in this repetitive loss area. It has one insurable building. Table 20-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 20-2.
ALL PROPERTIES IN ROWLAND HEIGHTS REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ROW1	1	Slab	Good	Extend existing side wall and provide ditch to convey flows from the slope Construct terraced wall to avoid slope failure (Construction will require neighbor's consent) Public education
Total	**1**			

CHAPTER 21.
TOPANGA CANYON A REPETITIVE LOSS AREA

21.1 PROBLEM STATEMENT

Figure 21-1 shows the Topanga Canyon A Repetitive Loss Area. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. This area is near Garapito Creek, approximately 550 feet upstream of its confluence with Topanga Canyon. The studies of Garapito Creek show Flood Hazard Zones A and AE, high-risk flood zones near RL Map 30. The property is located on the bank of Garapito Creek and is being accessed by a private bridge from the street (see Figure 21-1). The ground elevation of the house seems to be lower than the street, and the front door and wall were built on the bank slope. The problem associated with limited creek capacity and backwater effect caused by the small bridge. The property, however, is subject to much greater risk due to high flood discharges estimated for the 100-year and the Los Angeles County capital flood. The elevation for the lowest point of the house is about 920 feet, while the FEMA FIRM in Figure 21-1 shows that the 100-year water surface elevation of Garapito Creek at the location is approximately 926 feet. The creek is moderately vegetated, which may also contribute to the high water. This repetitive flooding problem appears to be isolated to the subject property.

21.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 21-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 21-1.
REPETITIVE LOSS PROPERTIES IN REPETITIVE TOPANGA CANYON A LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0028394	30	3/78, 2/80, 3/83, 2/92, 1/93	$9,247	No
Identified Flood Cause: The subject property is on the channel bank and partially in Garapito Creek. The problem is associated with limited creek capacity and a backwater effect caused by the small bridge				

TOPANGA CANYON A REPETITIVE LOSS AREA

Description: There is a single-building repetitive loss area near Garapito Creek, upstream of its confluence with Topanga Canyon.

21.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

The RL Map #30 property is the only property included in this repetitive loss area. It has one insurable building. Table 21-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 21-2.
ALL PROPERTIES IN TOPANGA CANYON A REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TOP-A1	1	Slab	Fair	Acquisition Elevation Convert flood-prone living space and replace with new story Public education
Total	**1**			

CHAPTER 22.
TOPANGA CANYON B REPETITIVE LOSS AREA

22.1 PROBLEM STATEMENT

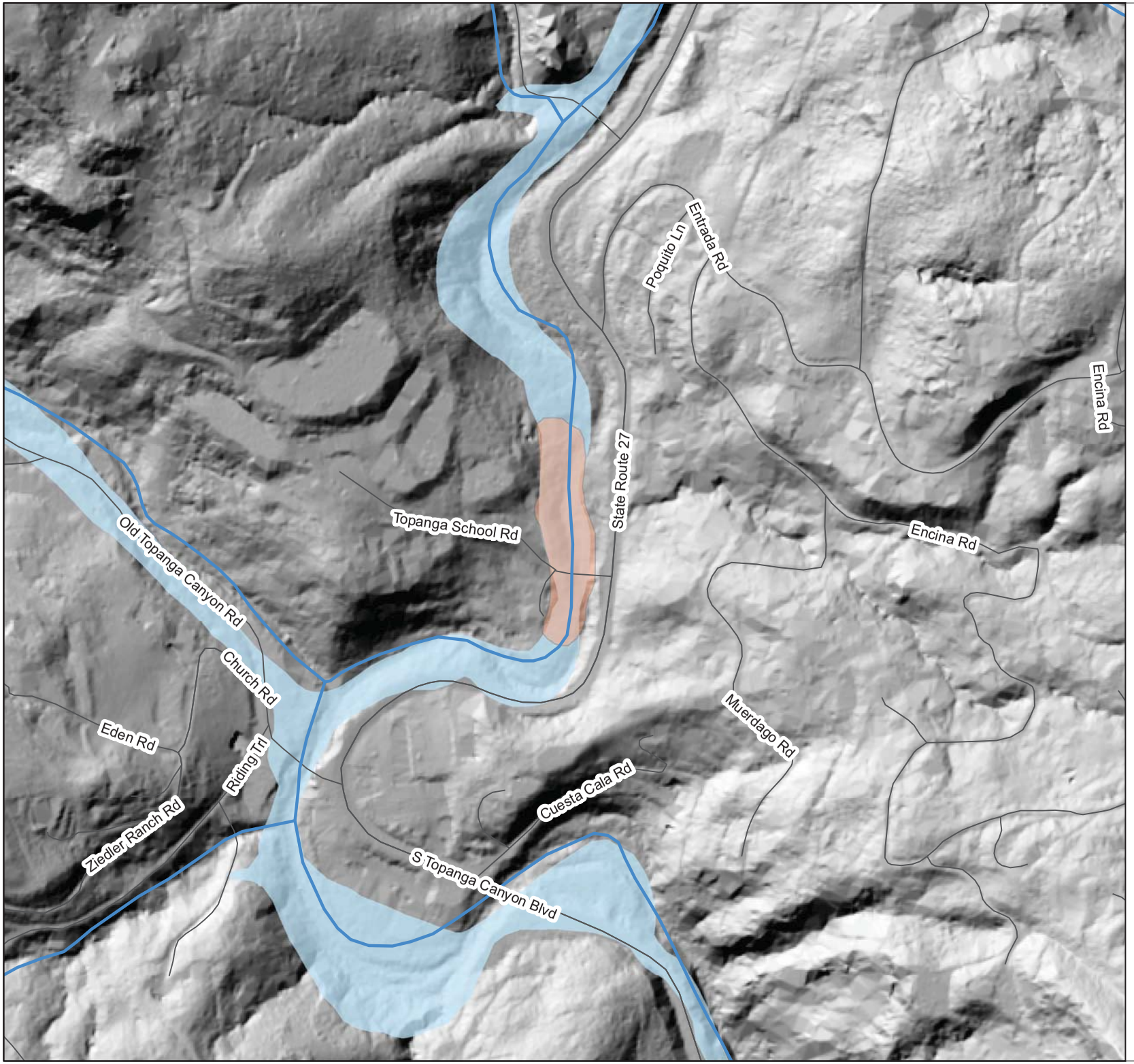
Figure 22-1 shows the Topanga Canyon B Repetitive Loss Area. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. This area is in the vicinity of Topanga Canyon, approximately 600 feet upstream of the Old Topanga Canyon confluence. RL Map 34 is subject to flooding from Topanga Canyon, which is commensurate with the flood risk reflected on the Flood Insurance Rate Map.

22.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 22-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 22-1.
REPETITIVE LOSS PROPERTIES IN TOPANGA CANYON B REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0012818	34	1/80, 2/80, 3/91, 2/92, 1/95	$7,872	No
Identified Flood Cause: Property in the channel and Flood Zone AE of Topanga Canyon. The elevation for the lowest point of the house is about 770 feet and is higher than the channel invert of Topanga Canyon (765 feet) by only 5 feet. Based on the FEMA FIRM in Figure 22-1, the water surface elevation of the area is approximately 772 feet, which could cause flooding of the house.				



Topanga Canyon B Repetitive Loss Area

Figure 22-1

Final Mapped Repetitive Loss Area

FEMA Flood Hazard Area

Incorporated Areas

Note: Mapped Repetitive Loss Areas are approximate.

Base Map Data Sources: Los Angeles County, ESRI

COUNTY OF LOS ANGELES CALIFORNIA

TETRA TECH

N

0 0.05 0.1 Miles

22.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Two properties with two insurable buildings have been identified in this repetitive loss area. Table 22-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 22-2.
ALL PROPERTIES IN TOPANGA CANYON B REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TOP-B1	1	Slab	Good	Acquisition Elevation Convert flood-prone living space and replace with new story Public education
TOP-B2	1	Crawlspace	Good	Acquisition Elevation Convert flood-prone living space and replace with new story Public education
Total	**2**			

CHAPTER 23.
TOPANGA CANYON C REPETITIVE LOSS AREA

23.1 PROBLEM STATEMENT

Figure 23-1 shows the Topanga Canyon C Repetitive Loss Area. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. This area is located in Calabasas. The identified RL property is newer construction and is located on a knoll of an area with a lot of topographic relief. The cause of flooding for this property appears to be associated with drainage from a surrounding hillside and is isolated to the identified repetitive loss property. This repetitive flooding problem is considered to be localized and isolated to the identified repetitive loss property. The fact that no subsequent claims have been filed in the last 10 years suggests that the problem has been rectified. No additional properties are identified for this area.

23.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 23-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 23-1.
REPETITIVE LOSS PROPERTIES IN TOPANGA CANYON C REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0111971	48	2/98, 3/01	$11,698	No
Identified Flood Cause: Localized flooding associated with hillside drainage.				

TOPANGA CANYON C REPETITIVE LOSS AREA

Description: There is a single-building repetitive loss area north of Schueren Road and South of Stunt Road in the vicinity of Mildas Drive and Moonrise Drive.

23.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

The RL Map #48 property is the only property included in this repetitive loss area. It has one insurable building. Table 23-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 23-2.
ALL PROPERTIES IN TOPANGA CANYON C REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TOP-C1	1	Crawlspace	Good	Establish drainage flow paths around structure Drainage system maintenance Floodwall Public education
Total	**1**			

CHAPTER 24.
TOPANGA CANYON D REPETITIVE LOSS AREA

24.1 PROBLEM STATEMENT

Figure 24-1 shows the Topanga Canyon D Repetitive Loss Area. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. This area is in Topanga within the Santa Monica Mountains in western Los Angeles County. The identified repetitive loss property for this area is not located in a FEMA mapped flood zone and the source of repetitive flood risk appears to be localized. The dates of loss correspond to 13-year storm events that occurred in early 2005. The property is located in a cul-de-sac. There is a gradient slope in this vicinity with properties above the identified RL property as well as below it. The cause of flooding is most likely associated drainage flows from the uphill neighbor. The other properties within this area are at ground elevations similar to that of the identified repetitive loss property and have lowest floors with similar elevations as well.

24.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 24-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 24-1.
REPETITIVE LOSS PROPERTIES IN TOPANGA CANYON D REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0137970	49	1/05, 2/05	$10,822	No
Identified Flood Cause: Localized drainage issue associated with interior drainage from private property				

Topanga Canyon D Repetitive Loss Area

Figure 24-1

Final Mapped Repetitive Loss Area

FEMA Flood Hazard Area

Incorporated Areas

Note: Mapped Repetitive Loss Areas are approximate.

Base Map Data Sources: Los Angeles County, ESRI

COUNTY OF LOS ANGELES CALIFORNIA

TETRA TECH

N

0 0.0325 0.065 Miles

24.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Two properties with two insurable buildings have been identified in this repetitive loss area. Table 24-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 24-2.
ALL PROPERTIES IN TOPANGA CANYON D REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TOP-D1	1	Crawlspace	Good	Create/maintain flow paths to public storm drains Drainage system maintenance Public education
TOP-D2	1	Crawlspace	Good	Create/maintain flow paths to public storm drains Drainage system maintenance Public education
Total	**2**			

CHAPTER 25.
TOPANGA CANYON E REPETITIVE LOSS AREA

25.1 PROBLEM STATEMENT

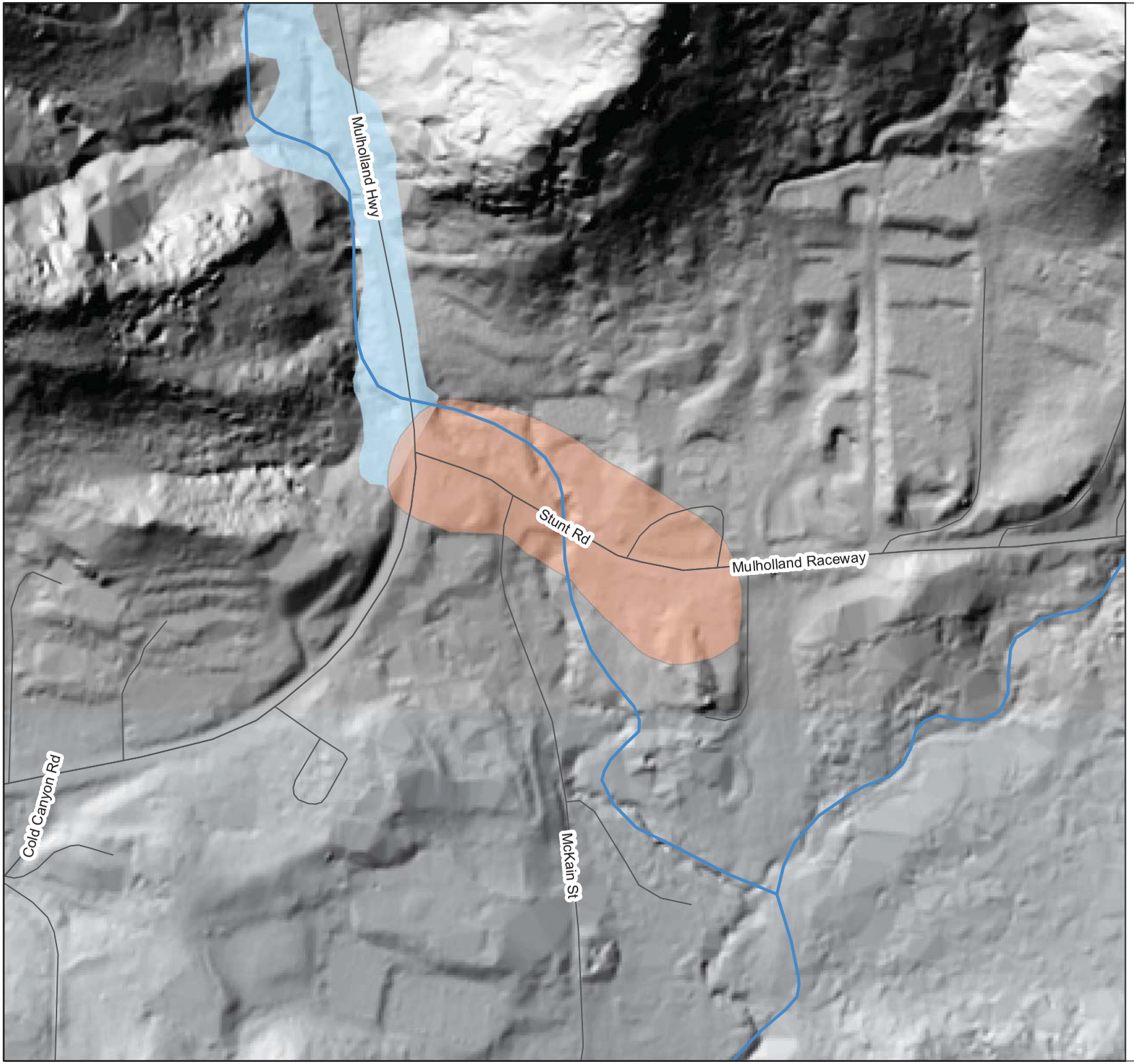
Figure 25-1 shows the Topanga Canyon E Repetitive Loss Area. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. This area is in the Santa Monica Mountains, in the western area of Los Angeles County and the southeastern area of Ventura County. The identified repetitive loss property for this area is located in Calabasas, in the northwest Santa Monica Mountains between Woodland Hills, Agoura Hills, West Hills, Hidden Hills, and Malibu. The property backs up to steep slope terrain of the Santa Monica Mountains. The two events in 1995 and 2005 were 5-year and 13-year storm events, respectively, based on stream gauging records. Based on topography, the flooding problem appears to be associated with runoff from the surrounding hillside. This problem could be exacerbated by wildfire activity within the region.

25.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 25-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 25-1.
REPETITIVE LOSS PROPERTIES IN TOPANGA CANYON E REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0138321	50	3/95, 1/05	$28,727	No
Identified Flood Cause: Hillside drainage.				



Topanga Canyon E Repetitive Loss Area

Figure 25-1

Final Mapped Repetitive Loss Area

FEMA Flood Hazard Area

Incorporated Areas

Note: Mapped Repetitive Loss Areas are approximate.

Base Map Data Sources: Los Angeles County, ESRI

TETRA TECH

N

0 0.0325 0.065 Miles

25.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Five properties with five insurable buildings have been identified in this repetitive loss area. Table 25-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 25-2.
ALL PROPERTIES IN TOPANGA CANYON E REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TOP-E1	1	Crawlspace	Good	Establish/maintain flow paths around structure to improved drainage system Hillside retaining wall Public education
TOP-E2	1	Crawlspace	Good	Establish/maintain flow paths around structure to improved drainage system Hillside retaining wall Public education
TOP-E3	1	Crawlspace	Good	Establish/maintain flow paths around structure to improved drainage system Hillside retaining wall Public education
TOP-E4	1	Crawlspace	Good	Establish/maintain flow paths around structure to improved drainage system Hillside retaining wall Public education
TOP-E5	1	Crawlspace	Good	Establish/maintain flow paths around structure to improved drainage system Hillside retaining wall Public education
Total	**5**			

CHAPTER 26.
TRIUNFO CANYON A REPETITIVE LOSS AREA

26.1 PROBLEM STATEMENT

Figure 26-1 shows the Triunfo Canyon A Repetitive Loss Area. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. This area is in the Santa Monica Mountains in the northwestern portion of Los Angeles County. This is an offsite drainage problem isolated to the single property. The property is located in the floodplain and Flood Hazard Zone AE. In the past, small private bridges and culverts in the creek running behind the house clogged with debris, causing water to overflow and run along Lobo Canyon Road in front of the subject property.

26.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 26-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 26-1.
REPETITIVE LOSS PROPERTIES IN TRIUNFO CANYON A REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0095737	24	1/95, 2/98	$23,454	No
Identified Flood Cause: Property is in flood Zone AE of Lobo Canyon (behind the house). Past clogging of small private bridges and culverts in the creek caused water to overflow onto the street and flood the property. No losses reported since 1998. The structure's windows are boarded up and it is assumed to be vacant.				

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TRIUNFO CANYON A REPETITIVE LOSS AREA

Description: This area is in the Santa Monica Mountains in the northwestern portion of Los Angeles County. There is a single-building repetitive loss area on Lobo Canyon Road.

26.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

The RL Map #24 property is the only property included in this repetitive loss area. It has one insurable building. Table 26-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 26-2.
ALL PROPERTIES IN TRIUNFO CANYON A REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TRI-A1	1	Slab	Fair	Acquisition Elevation Berm Floodwall Public education
Total	**1**			

CHAPTER 27.
TRIUNFO CANYON B REPETITIVE LOSS AREA

27.1 PROBLEM STATEMENT

Figure 27-1 shows the Triunfo Canyon B Repetitive Loss Area. This area is in the Santa Monica Mountains in the northwestern portion of Los Angeles County. RL Map 43 is at the base of a hillside and receives runoff from the adjacent hills. Based on topography, the property is subject to runoff from the hillside behind the property.

27.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 27-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

TABLE 27-1.
REPETITIVE LOSS PROPERTIES IN TRIUNFO CANYON B REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0137793	43	2/98, 1/05	$13,473	No

Identified Flood Cause: There is no house on the subject property. Based on topography, the property is subject to runoff from the hillside behind the property.

TRIUNFO CANYON B REPETITIVE LOSS AREA

Description: This area is in the Santa Monica Mountains in the northwestern portion of Los Angeles County. There is a single-building repetitive loss area on Hidden Highland Road.

27.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

The RL Map #43 property is the only property included in this repetitive loss area. It has one insurable building. Table 27-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

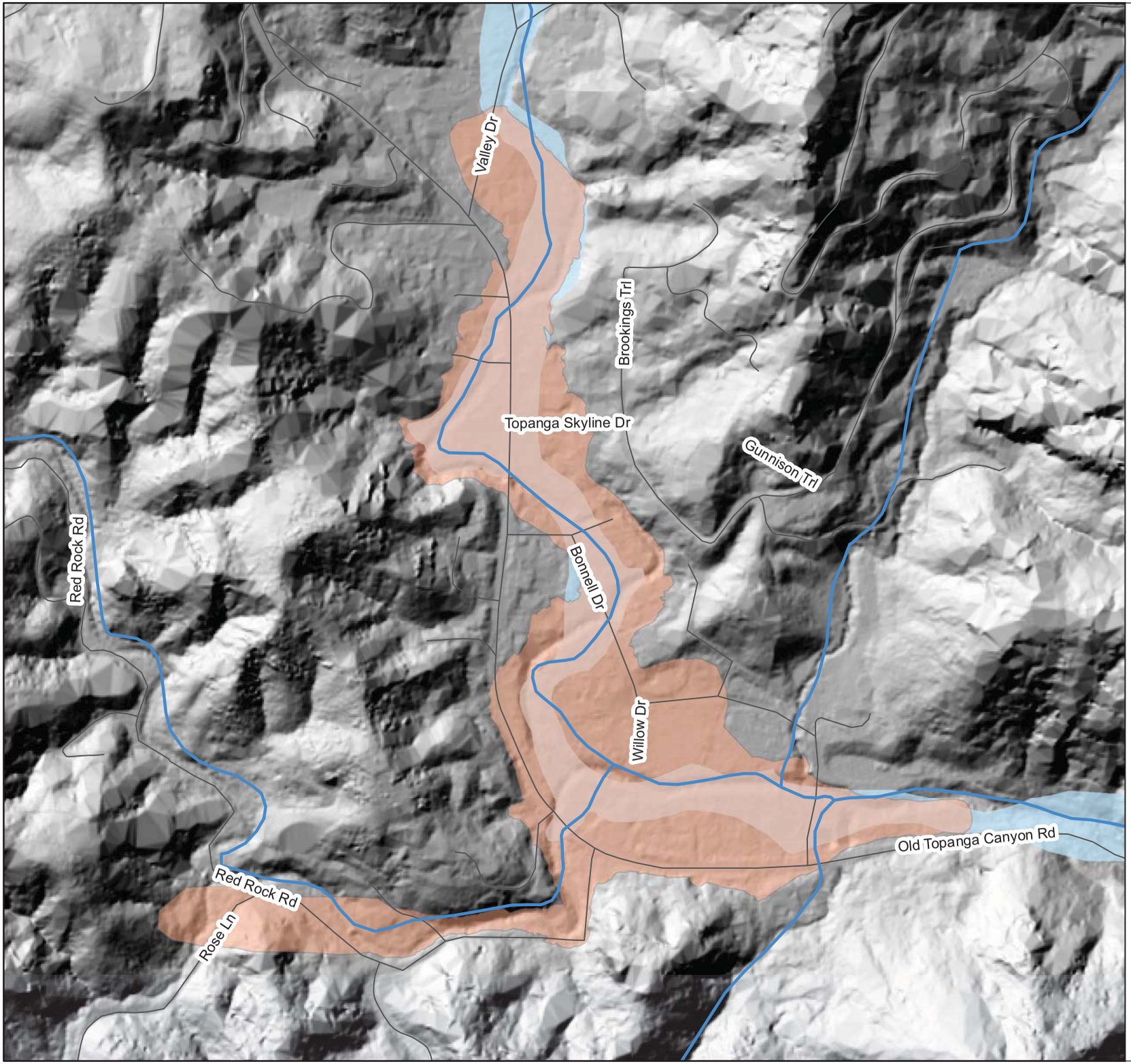
TABLE 27-2.
ALL PROPERTIES IN TRIUNFO CANYON B REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TRI-B1	1	Slab	Good	Establish drainage flow paths around structure Elevation Drainage system maintenance Public education
Total	**1**			

CHAPTER 28.
UPPER TOPANGA CANYON REPETITIVE LOSS AREA

28.1 PROBLEM STATEMENT

Figure 28-1 shows the Upper Topanga Canyon Repetitive Loss Area, which is inclusive of RL Map areas 29, 31, 32, 33 and 47 from past planning efforts. Flood zones as mapped on FEMA Flood Insurance Rate Maps are also shown on the figure. These areas are in the Topanga Canyon area of Los Angeles County, approximately 26 miles northwest of the City of Los Angeles. All properties in these designated areas are either in or immediately adjacent to the FEMA-mapped 100-year floodplain for Topanga Canyon. The Topanga Canyon is located in the western area of Los Angeles County, and its contributing watershed is the second largest watershed in the Santa Monica Mountains. Sources of flooding in the Topanga Canyon area consist of storm runoff in Topanga Creek and associated storm drainage facilities. Historically, flooding occurs from 5-year or greater flood events. Because most of the repetitive loss properties are located within the low-lying floodplain areas immediately adjacent to the low-flow channels, it is expected that without mitigation, these properties will continue to be subject to future floods.



Upper Topanga Canyon Repetitive Loss Area

Figure 28-1

Final Mapped Repetitive Loss Area

FEMA Flood Hazard Area

Incorporated Areas

Note: Mapped Repetitive Loss Areas are approximate.

Base Map Data Sources: Los Angeles County, ESRI

COUNTY OF LOS ANGELES CALIFORNIA

TETRA TECH

N

0 0.05 0.1 Miles

28.2 IDENTIFIED REPETITIVE LOSS PROPERTIES

Table 28-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

TABLE 28-1.
REPETITIVE LOSS PROPERTIES IN UPPER TOPANGA CANYON REPETITIVE LOSS AREA

FEMA RL #	RL Map #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
0074656	29	1/95, 3/95	$6,972	No
Identified Flood Cause: Property on the bank next to Old Topanga Canyon. Crawlspace foundation with finished floor below 100-year water surface elevation. Damage caused by 5-year return interval event in 1995. No reported damage since.				
0074334	31	2/92, 1/95	$11,451	No
Identified Flood Cause: Property on the bank next to Old Topanga Canyon. Crawlspace foundation with finished floor below 100-year water surface elevation. Damage caused by 5-year return interval event in 1995. No reported damage since.				
0074553	32	1/95, 3/95	$10,276	No
Identified Flood Cause: In 1983 & 1993, the water from the natural creek tributary east of the house, overtopping Old Topanga Cyn Road and pouring into the house. The owner claimed no more problems with the tributary flooding. 2) The property is still subject to flooding from Old Topanga Cyn channel (Zone AE). The property is in Zone AE, which has significant risk from a 100-year flood. The tributary flow may continue to overtop the street if the culvert inlet becomes obstructed by debris from the upstream reach.				
0076269	33	1/95, 3/95	$29,354	No
Identified Flood Cause: Property No. 33 was not mapped by FEMA, but was confirmed by field investigation to be subject to a high risk from Red Rock Canyon flooding. The property is located on the opposite bank from Red Rock Road and is being accessed by a pedestrian bridge crossing the creek. The creek is very shallow without the capacity to carry the estimated 810 cubic feet per second of the 100-year flood discharge, and the bridge has a very low clearance, which can cause further flow blockage and higher backwater.				
0074498	47	1/95, 3/95	$9,692	No
Identified Flood Cause: Crawlspace foundation with finished floor below 100-year water surface elevation. Damage caused by 5-year return interval event in 1995. No reported damage since.				

28.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Forty-nine properties with 53 insurable buildings have been identified in this repetitive loss area. Table 28-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

TABLE 28-2.
ALL PROPERTIES IN UPPER TOPANGA CANYON REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
UTC1	1	Crawlspace	Good	Maintain flow paths around structure Retaining wall Public education
UTC2	2	Slab	Fair	Elevation Acquisition Flood-proofing Public education
UTC3	1	Slab	Fair	Elevation Acquisition Flood-proofing Public education
UTC4	1	Slab	Fair	Elevation Acquisition Flood-proofing Public education
UTC5	1	Slab	Fair	Elevation Acquisition Flood-proofing Public education
UTC6	1	Slab	Fair	Elevation Acquisition Flood-proofing Public education
UTC7	2	Slab	Fair	Elevation Acquisition Flood-proofing Public education
UTC8	1	Crawlspace	Fair	Elevation Flood-proofing Retaining wall on creek side Public education
UTC9	1	Crawlspace	Fair	Elevation Acquisition Flood-proofing Public education
UTC10	1	Slab	Good	Maintain flow paths around structure Retaining wall Public education

TABLE 28-2.
ALL PROPERTIES IN UPPER TOPANGA CANYON REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
UTC11	1	Slab	Fair	Elevation Acquisition Flood-proofing Public education
UTC12	1	Crawlspace	Fair	Elevation Acquisition Flood-proofing Public education
UTC13	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
UTC14	1	Crawlspace	Fair	Elevation Flood-proofing Retaining wall on creek side Public education
UTC15	1	Slab	Fair	Elevation Flood-proofing Retaining wall on creek side Public education
UTC16	1	Slab	Fair	Elevation Flood-proofing Retaining wall on creek side Public education
UTC17	2	Slab	Fair	Elevation Flood-proofing Retaining wall on creek side Public education
UTC18	1	Slab	Fair	Elevation Flood-proofing Retaining wall on creek side Public education
UTC19	1	Slab	Fair	Elevation Flood-proofing Retaining wall on creek side Public education
UTC20	1	Slab	Fair	Elevation Flood-proofing Retaining wall on creek side Public education
UTC21	1	Slab	Good	Elevation Acquisition Flood-proofing Public education

TABLE 28-2.
ALL PROPERTIES IN UPPER TOPANGA CANYON REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
UTC22	1	Slab	Good	Elevation Acquisition Flood-proofing Public education
UTC23	1	Slab	Fair	Elevation Acquisition Flood-proofing Public education
UTC24	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
UTC25	1	Crawlspace	Fair	Elevation Acquisition Flood-proofing Public education
UTC26	1	Slab	Good	Elevation Acquisition Flood-proofing Public education
UTC27	1	Slab	Good	Elevation Acquisition Flood-proofing Public education
UTC28	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
UTC29	1	Slab	Good	Elevation Acquisition Flood-proofing Public education
UTC30	2	Slab	Fair	Elevation Acquisition Flood-proofing Public education
UTC31	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
UTC32	1	Slab	Fair	Elevation Acquisition Flood-proofing Public education
UTC33	1	Slab	Good	Maintain flow paths around structure Retaining wall Public education

TABLE 28-2.
ALL PROPERTIES IN UPPER TOPANGA CANYON REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
UTC34	1	Slab	Good	Maintain flow paths around structure Retaining wall Public education
UTC35	1	Slab	Good	Maintain flow paths around structure Retaining wall Public education
UTC36	1	Slab	Good	Flood-proof lower level and retaining wall on creek side Public Education
UTC37	1	Slab	Good	Flood-proof lower level and retaining wall on creek side Public Education
UTC38	1	Slab	Good	Elevation Acquisition Flood-proofing Public education
UTC39	1	Crawlspace	Fair	Elevation Acquisition Flood-proofing Public education
UTC40	1	Slab	Fair; Hotel/ Apartment Bldg.	Elevation Acquisition Flood-proofing Public education
UTC41	1	Slab	Fair	Elevation Acquisition Flood-proofing Public education
UTC42	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
UTC43	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
UTC44	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
UTC45	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education

TABLE 28-2.
ALL PROPERTIES IN UPPER TOPANGA CANYON REPETITIVE LOSS AREA

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
UTC46	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
UTC47	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
UTC48	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
UTC49	1	Crawlspace	Good	Elevation Acquisition Flood-proofing Public education
Total	**53**			

Part 3 —
Repetitive Loss Area Action Plan

CHAPTER 29.
REPETITIVE LOSS AREA ACTION PLAN

29.1 MITIGATION ACTIONS

This Los Angeles County Repetitive Loss Area Analysis was created in conjunction with the development of the 2015 Los Angeles County Comprehensive Floodplain Management Plan. The two processes were created simultaneously, and while each will be maintained separately by the County, they are both functional annexes of each other. The floodplain management plan identified and prioritized an action plan that will have direct relevance to this RLAA. This action plan has been adapted to apply to the RLAA and is shown in Table 29-1. The following information is presented for each action plan item:

- Action item **number** and **description**
- **Lead agency** responsible for implementing the action item
- **Support agencies** expected to participate in the implementation
- Agencies or programs that may be able to provide **funding** to implement the action item
- An estimated **cost** range:
  - **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases). Costs are estimated to be greater than $5 million.
  - **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years. Costs are estimated to be between $500,000 and $5 million.
  - **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program. Costs are estimated to be less than $500,000.
- A statement of **timing** for implementing the action item:
  - Ongoing—This action already occurs and will continue
  - Short term—This action would be implemented within five years
  - Long term— This action would be implemented after five years
- A list of the **RL map numbers that would be affected** by the action item
- Indication of whether the action item was **included in the previous RLAA** and, if so, its number in that previous document.

TABLE 29-1.
ACTION PLAN—FLOOD MITIGATION INITIATIVES

Possible Funding Sources or Resources	Estimated Project Cost	Timeline	Affected RL Map #	In Previous Plan? Initiative #
1—Promote awareness of flood hazards to residents in repetitive loss areas. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Regional Planning Department, Public Works (Building and Safety Division)				
FEMA; California Emergency Management Agency (Cal EMA); County DPW; County Regional Planning Department	Low	Ongoing	All	Yes-3
2—Develop and distribute flood protection information and materials to property owners, renters, and developers in repetitive loss areas. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Public Works (Public Relations Group, Building and Safety Division, Land Development Division, Program for Public Information)				
County DPW	Low	Ongoing	All	Yes-21
3—Maintain a list of critical facilities located in FEMA-designated flood zones, provide flood protection information to operators of these critical facilities, and encourage the implementation of flood protection measures. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** CEO (Office of Emergency Management), Public Works (Disaster Services Group)				
County DPW; County OEM	Low	Ongoing	1-25, 29-34, 37,45-47	No
4—Investigate Repetitive Loss Properties identified by FEMA and update the repetitive loss property and high-risk property list. Conduct the following flood control activities for these properties: • Annually notify owners regarding local flood hazards and proper protection activities • Provide technical advice regarding flood protection and flood preparedness • Distribute a revised questionnaire to new Repetitive Loss Properties. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Public Works (Building and Safety Division, Program for Public Information)				
County DPW	Low	Ongoing	All	Yes-12, 20
5—Make sand bags available to repetitive loss area property owners during the wet season, provide notifications of the availability of these materials, and track the distribution of the materials. **Lead Agency:** Fire Department, Public Works (Administrative Services Division, Watershed Management Division) **Support Agencies:** Public Works (Public Relations Group)				
FEMA; Cal EMA; Fire Department; County DPW	Low	Ongoing	All	Yes-17
6—Provide public education about maintaining the stormwater system free of debris. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Public Works (Public Relations Group, Flood Maintenance Division, Road Maintenance Division, Program for Public Information)				
County DPW	Low	Ongoing	All	Yes-22
7—Continue to maintain/enhance the County's classification under the Community Rating System to address increased flood insurance costs and promote safety and preparedness. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Regional Planning Department, Public Works (Flood Maintenance Division, Water Resources Division, Program Development Division, Public Relations Group, Program for Public Information)				
County DPW	Low	Ongoing	All	No

TABLE 29-1.
ACTION PLAN—FLOOD MITIGATION INITIATIVES

Possible Funding Sources or Resources	Estimated Project Cost	Timeline	Affected RL Map #	In Previous Plan? Initiative #
8—Include repetitive loss areas in the implementation of the Program for Public Information (PPI) protocol identified in the Los Angeles County Comprehensive Floodplain Management Plan and include appropriate messaging for compliance with ADA. **Lead Agency:** Public Works (Watershed Management Division, Public Relations Group)				
FEMA; Cal EMA; County DPW	Low	Ongoing	All	No
9—Provide emergency preparedness and flood protection information to the repetitive loss areas. **Lead Agency:** CEO (Office of Emergency Management) **Support Agencies:** Public Works (Watershed Management Division, Program for Public Information, Water Resources Division, Public Relations Group)				
FEMA; Cal EMA; County OEM; County DPW; USC Sea Grant	Low	Ongoing	All	Yes-23
10—Distribute information to repetitive loss areas regarding flood prevention and flood insurance at emergency operations and emergency preparedness events. **Lead Agency:** CEO (Office of Emergency Management) **Support Agencies:** Public Works (Watershed Management Division, Water Resources Division, Public Relations Group, Program for Public Information)				
FEMA; Cal EMA; County OEM; County DPW	Low	Ongoing	All	Yes-24
11—Develop and maintain a list of problem sites, including those associated with the sources for repetitive flooding, where a maintenance solution would be the top priority **Lead Agency:** Public Works (Flood Maintenance Division) **Support Agencies:** Public Works (Watershed Management Division, Water Resources Division, Road Maintenance Division)				
County DPW	Low	Ongoing	26-28, 35, 36, 38-44, 48-50	Yes-8
12—Conduct routine maintenance of flood control facilities and additional maintenance as needed at identified problem sites, including identified repetitive loss areas. **Lead Agency:** Public Works (Flood Maintenance Division, Road Maintenance Division)				
County DPW	Low	Ongoing	All	Yes-9
13—Conduct a stormwater facilities condition assessment to identify the physical and hydraulic condition of the system and to support infrastructure upgrades or enhancements. **Lead Agency:** Public Works (Flood Maintenance Division) **Support Agencies:** Public Works (Watershed Management Division, Water Resources Division)				
County DPW	Low	Ongoing	All	Yes-7
14—Evaluate storm drain, open channel, and flood retention basin facilities for future improvements. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Public Works (Design Division, Flood Maintenance Division, Water Resources Division) Stakeholders				
County DPW	Low	Ongoing	All	Yes-18
15—Pursue appropriate flood hazard mitigation grant funding. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Public Works (Programs Development Division, Disaster Services Group), CEO (Office of Emergency Management)				
County DPW; County OEM	Low	Ongoing	All	Yes-1

TABLE 29-1.
ACTION PLAN—FLOOD MITIGATION INITIATIVES

Possible Funding Sources or Resources	Estimated Project Cost	Timeline	Affected RL Map #	In Previous Plan? Initiative #
16—Where feasible and cost effective**, c**onsider the conversion of high-risk properties into open space. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Regional Planning Department, Parks and Recreation				
FEMA; U.S. EPA; Cal EMA; Cal EPA; County DPW; County Regional Planning Department; County Parks and Recreation	Medium	Ongoing	All	Yes-13
17—Refine the plan check system to track properties in the flood zone and address drainage. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Public Works (Building and Safety Division, Land Development Division)				
County DPW	Low	Ongoing	1-25, 29-34, 37,45-47	Yes-10
18—Flag Repetitive Loss Properties in the plan, and check database for review and approval of building permit applications. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Public Works (Building and Safety Division)				
County DPW	Low	Ongoing	All	Yes-11
19—Maintain a database system for tracking all reviewed and approved elevation certificates prior to the closure of a building permit. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Public Works (Building and Safety Division, Information Technology Division)				
County DPW	Low	Ongoing	1-25, 29-34, 37,45-47	No
20—Evaluate opportunities for incorporating watershed ecosystem restoration where feasible as an additional element of projects that protect repetitive loss areas. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Regional Planning Department, Public Works (Water Resources Division), Stakeholders				
FEMA, U.S. EPA; Cal EMA; Cal EPA; County DPW; County Regional Planning Department	Low	Ongoing	1-25, 29-34, 37,45-47	Yes-4
21—Where feasible, cost-effective and supported by the community, restore the natural and beneficial functions of floodplains. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Public Works (Programs Development Division)				
FEMA; U.S. EPA; Cal EMA; Cal EPA; County DPW	High/ Medium	Long term	1-25, 29-34, 37,45-47	No
22—Encourage the application of biological resource measures for the control of stormwater and erosion to the best of their applicable limits. **Lead Agency:** Fire Department, Public Works (Building and Safety Division, Design Division, Land Development Division) **Support Agencies:** Regional Planning Department, Public Works (Environmental Programs Division, Watershed Management Division, Project Management Division, Water Resources Division)				
FEMA; U.S. EPA; Cal EMA; Cal EPA; County Fire Department; County DPW	Low	Ongoing	All	Yes-16

TABLE 29-1.
ACTION PLAN—FLOOD MITIGATION INITIATIVES

Possible Funding Sources or Resources	Estimated Project Cost	Timeline	Affected RL Map #	In Previous Plan? Initiative #
23—Maintain the Operational Area Emergency Response Plan. **Lead Agency:** CEO (Office of Emergency Management) **Support Agencies:** Public Works (Disaster Services Group, Watershed Management Division)				
FEMA; Cal EMA; County DPW; County OEM	Low	Ongoing	All	Yes-2
24—Maintain standards for the use of structural and non-structural techniques that mitigate flood hazards and manage stormwater pollution. **Lead Agency:** Public Works (Building and Safety Division, Design Division, Land Development Division) **Support Agencies:** Public Works (Watershed Management Division)				
County DPW	Low	Ongoing	All	Yes-14
25—Continue to require environmental review in the development process to provide for the creation or protection of natural resources that can mitigate the impacts of development. **Lead Agency:** Regional Planning Department **Support Agencies:** Public Works (Watershed Management Division, Programs Development Division, Land Development Division)				
County DPW; County Regional Planning Department	Low	Ongoing	All	Yes-15
26—Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone repetitive loss areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Regional Planning Department, Parks and Recreation, Public Works (Building and Safety Division, Programs Development Division)				
FEMA Hazard Mitigation Grant Program, Pre-Disaster Mitigation Grant Program, and Flood Mitigation Act; U.S. HUD; Cal EMA; County DPW; County OEM; County Regional Planning Department; County Parks and Recreation	Low	Ongoing	All	Yes-13
27—Use risk-based information from the Los Angeles County Comprehensive Floodplain Management Plan and the Los Angeles County Hazard Mitigation Plan to update the Safety Element of the County's General Plan. **Lead Agency:** Regional Planning Department **Support Agencies:** Public Works (Watershed Management Division)				
County Regional Planning Department; County DPW	Low	Short term	1-25, 29-34, 37,45-47	No
28—Continue to maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Public Works (Building and Safety Division, Land Development Division, Flood Maintenance Division, Water Resources Division), Regional Planning Department				
County DPW	Low	Ongoing	1-25, 29-34, 37,45-47	No

TABLE 29-1.
ACTION PLAN—FLOOD MITIGATION INITIATIVES

Possible Funding Sources or Resources	Estimated Project Cost	Timeline	Affected RL Map #	In Previous Plan? Initiative #
29—Consider the best available data and science to determine probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the County's floodplain management program. **Lead Agency:** Public Works (Watershed Management Division)				
FEMA; U.S. EPA; Cal EMA; Cal EPA; County DPW; USC Sea Grant	Low	Long term	All	No
30—Identify flood-warning systems for properties where such systems can be beneficially deployed. These would include repetitive loss properties located in the Special Flood Hazard Area. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** CEO (Office of Emergency Management), Sheriff's Department, Public Works (Flood Maintenance Division, Disaster Services Group, Water Resources Division)				
FEMA Hazard Mitigation Grant Program , Pre-Disaster Mitigation Grant Program, and Flood Mitigation Act; Cal EMA; County DPW; County OEM	Low	Ongoing	1-25, 29-34, 37,45-47	Yes-6
31— Consider the development of a comprehensive flood warning and response plan for the unincorporated County that would become a functional annex to the Operational Area Emergency Response Plan and meet the Community Rating System Activity 610 requirements. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** CEO (Office of Emergency Management), Public Works (Disaster Services Group)				
FEMA; Cal EMA; County DPW; County OEM	Medium/ Low	Long Term	All	No
32—Continue to enforce the County's development regulations to prevent increases of the flood hazard on adjacent properties. **Lead Agency:** Public Works (Building and Safety Division, Land Development Division) **Support Agencies:** Public Works (Watershed Management Division)				
County DPW	Low	Ongoing	All	No
33—Conduct an evaluation of FEMA-designated flood zones and revise/update them to reflect current conditions. **Lead Agency:** Public Works (Watershed Management Division) **Support Agencies:** Public Works (Water Resources Division)				
FEMA; Cal EMA; County DPW	Medium/ Low	Ongoing	1-25, 29-34, 37,45-47	No
34—Continue to maintain and update the Hazus-MH model constructed to support the development of the Comprehensive Floodplain Management Plan, in order to make flood risk information available to repetitive loss area property owners. **Lead Agency:** Public Works (Watershed Management Division)				
FEMA; Cal EMA; County DPW	Low	Ongoing	All	No
35—Continue County coordination with other agencies and stakeholders on issues of flood control. **Lead Agency:** Public Works (Watershed Management Division)				
County DPW	Low	Ongoing	All	No

29.2 BENEFIT/COST ANALYSIS

The action plan is prioritized according to a benefit/cost analysis of the proposed projects (CRS Step 8). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program and Pre-Disaster Mitigation grant program. A less formal approach was used because some projects may not be implemented for some time , and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was performed. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

Cost ratings were defined as follows:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases). Costs are estimated to be greater than $5 million.
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years. Costs are estimated to be between $500,000 and $5 million.
- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program. Costs are estimated to be less than $500,000.

Benefit ratings were defined as follows:

- **High—**Project will provide an immediate reduction of risk exposure for life and property.
- **Medium—**Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low—**Long-term benefits of the project are difficult to quantify in the short term. Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

For many of the strategies identified in this action plan, Los Angeles County may seek financial assistance under the Hazard Mitigation Grant Program or Hazard Mitigation Assistance programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, Los Angeles County reserves the right to define “benefits” according to parameters that meet floodplain management goals and objectives.

29.3 ACTION PLAN PRIORITIZATION

Table 29-2 lists the priority of each action item assigned by the planning team, using the same parameters used in selecting the action items. A qualitative benefit-cost review was performed for each action item. The priorities are defined as follows:

- **High Priority**—A project that meets multiple objectives, has benefits that exceed cost, has funding secured or is an ongoing project and meets eligibility requirements for a grant program. High priority projects can be completed in the short term (1 to 5 years). The key factors for high priority projects are that they have funding secured and can be completed in the short term.

- **Medium Priority**—A project that meets goals and objectives, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible. Project can be completed in the short term, once funding is secured. Medium priority projects will become high priority projects once funding is secured. The key factors for medium priority projects are that they are eligible for funding, but do not yet have funding secured, and they can be completed within the short term.
- **Low Priority**—A project that will mitigate the risk of the flood hazard, that has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for FEMA grant funding, and for which the time line for completion is long term (1 to 10 years). Low priority projects may be eligible for grant funding from other programs. Low priority projects are "blue-sky" projects. How they will be financed is unknown, and they can be completed over a long term.

29.4 ANNUAL EVALUATION REPORT

Los Angeles County will prepare an annual evaluation report for its area analyses. The report will include a review of each action item, including a description of what was implemented or not implemented, and recommended changes to the actions items as appropriate. The report will be made available to the media and the public and will be submitted with the annual CRS recertification.

TABLE 29-2.
PRIORITIZATION OF MITIGATION INITIATIVES

Initiative	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant Eligible?	Can Project be Funded Under Existing Programs/ Budgets?	Priority (High, Med., Low)
1	3	Medium	Low	Yes	Yes	Yes	High
2	2	Medium	Low	Yes	No	Yes	High
3	2	High	Low	Yes	No	Maybe	High
4	4	High	Low	Yes	No	Yes	High
5	3	High	Low	Yes	Yes	Yes	High
6	3	Medium	Low	Yes	No	Yes	High
7	6	Medium	Low	Yes	No	Yes	High
8	3	Medium	Low	Yes	Yes	Maybe	High
9	3	Medium	Low	Yes	Yes	Yes	High
10	3	Medium	Low	Yes	No	Yes	High
11	2	Low	Low	Yes	No	Yes	High
12	2	Medium	Low	Yes	No	Yes	High
13	3	Low	Low	Yes	No	Yes	High
14	2	Medium	Low	Yes	No	Yes	High
15	3	Low	Low	Yes	No	Yes	High
16	3	Medium	Medium	Yes	Yes	Yes	High
17	4	Medium	Low	Yes	No	Maybe	Medium
18	3	Medium	Low	Yes	No	Yes	High
19	3	Medium	Low	Yes	No	Maybe	High
20	3	Low	Low	Yes	Yes	Yes	High
21	5	Medium	High/ Medium	No	Yes	No	Medium
22	3	Medium	Low	Yes	Yes	Yes	High
23	3	Medium	Low	Yes	Yes	Yes	High
24	4	Medium	Low	Yes	No	Yes	High
25	2	Medium	Low	Yes	No	Yes	High
26	3	High	Low	Yes	Yes	Yes	High
27	3	Low	Low	Yes	No	Yes	High
28	6	Medium	Low	Yes	No	Yes	High
29	4	Medium	Low	Yes	Yes	Maybe	High
30	3	Medium	Low	Yes	Yes	Maybe	Medium
31	2	Medium	Medium/ Low	Yes	Yes	Maybe	High
32	3	Medium	Low	Yes	No	Yes	High
33	3	Low	Medium/ Low	No	Yes	Maybe	Medium
34	2	Medium	Low	Yes	Yes	Maybe	High
35	3	Low	Low	Yes	No	Yes	Medium

CHAPTER 30.
PLAN ADOPTION

This chapter documents formal adoption of the *Los Angeles County Repetitive Loss Area Analysis* by the Los Angeles County Board of Supervisors (CRS Step 9). Los Angeles County formally adopted the plan on September 6, 2016. A copy of the resolution is provided on the following pages.

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

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GAIL FARBER, Director

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ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE

ADOPTED
BOARD OF SUPERVISORS
COUNTY OF LOS ANGELES
63 September 6, 2016

LORI GLASGOW
EXECUTIVE OFFICER

September 06, 2016

The Honorable Board of Supervisors
County of Los Angeles
383 Kenneth Hahn Hall of Administration
500 West Temple Street
Los Angeles, California 90012

Dear Supervisors:

ADOPT THE FLOODPLAIN MANAGEMENT PLAN AND REPETITIVE LOSS AREA ANALYSIS (ALL SUPERVISORIAL DISTRICTS) (3 VOTES)

SUBJECT

This action is to seek adoption of the Los Angeles County Comprehensive Floodplain Management Plan and the Los Angeles County Repetitive Loss Area Analysis by the Board to enable the County of Los Angeles to retain its eligibility in the National Flood Insurance Program's Community Rating System.

IT IS RECOMMENDED THAT THE BOARD:

1. Find that the adoption of the Comprehensive Floodplain Management Plan dated July 2016 and the Repetitive Loss Area Analysis dated July 2016 is exempt from the California Environmental Quality Act for the reasons stated in this letter and in the record of the project.

2. Approve and adopt the Los Angeles County Comprehensive Floodplain Management Plan dated July 2016.

3. Approve and adopt the Los Angeles County Repetitive Loss Area Analysis dated July2016.

PURPOSE/JUSTIFICATION OF RECOMMENDED ACTION

The County of Los Angeles has been a participant in the National Flood Insurance Program (NFIP) since 1980, which enables the County to obtain Federal assistance and make flood insurance

available for property owners in the County unincorporated areas. Since 1990, the County has also participated in the NFIP's Community Rating System (CRS) Program, which enables property owners in County unincorporated areas to qualify for discounted flood insurance premiums. The County currently has a CRS Class 7 Rating, resulting in an up to 15 percent reduction in flood insurance premiums for property owners in the unincorporated areas.

To retain eligibility in the NFIP's CRS Program, the County is required to develop a Floodplain Management Plan and to update and readopt it every 5 years. The County must also identify and analyze properties that have suffered recurring flood damage (repetitive loss properties). These updates are being provided in the enclosed Repetitive Loss Area Analysis.

Both documents were developed following the prescribed steps in the NFIP's 2013 Community Rating System Coordinator's Manual, which required more community input and involvement than past years. Consequently, a steering committee was established for the development of the Floodplain Management Plan, comprised of seven government and six nongovernment representatives. Other County departments participating in the steering committee included the Department of Regional Planning and the Fire Department. In addition, seven community meetings were held, six presentations were conducted to Town Councils, and the documents were available for public review and comment.

Implementation of Strategic Plan Goals

The Countywide Strategic Plan directs the provisions of Community Support and Responsiveness (Goal 2). The Comprehensive Floodplain Management Plan and the Repetitive Loss Area Analysis identify mitigation measures that can be implemented by the County, property owners, and organizations to improve the community's emergency preparedness.

FISCAL IMPACT/FINANCING

There will be no impact to the County General Fund.

Funding for typical annual CRS activities is included in the Flood Fund Fiscal Year 2016-17 Budget. The adoption of the plans will have no binding funding obligation on the County or the Los Angeles County Flood Control District (LACFCD), but future actions in the Floodplain Management Plan undertaken will be appropriately budgeted in future fiscal years.

FACTS AND PROVISIONS/LEGAL REQUIREMENTS

The Comprehensive Floodplain Management Plan is an overall strategy of programs, projects, and measures that will reduce the adverse impacts of flooding on the community. It includes a risk assessment for all properties subject to flood hazard, mitigation initiatives that may be implemented, and flood risk outreach to be conducted annually.

The Repetitive Loss Area Analysis addresses 55 repetitive loss properties in the unincorporated areas plus adjacent properties that may be subjected to the same flood hazards. This document describes the source of the flood problems, provides a list of mitigation measures that can be implemented to prevent future flood damage, and identifies the annual outreach to be conducted by the County.

The Board adopted the previous Floodplain Management Plan on May 11, 2010. The Federal Emergency Management Agency (FEMA) has reviewed the updated Comprehensive Floodplain

Management Plan and the Repetitive Loss Area Analysis and has determined that both plans meet the NFIP requirements, pending adoption by the Board.

ENVIRONMENTAL DOCUMENTATION

The recommended actions are exempt from the California Environmental Quality Act pursuant to Section 15262 of the State California Environmental Quality Act Guidelines and Section 21102 of the Public Resources Code relating to planning and feasibility studies for possible future actions, which the Board has not adopted, approved, or funded.

IMPACT ON CURRENT SERVICES (OR PROJECTS)

There will be no adverse impact on any other current services and/or projects as a result of this action.

If the plans are not adopted, the County's CRS Class Rating will drop to Class 10, resulting in the loss of the discounted flood insurance premiums.

CONCLUSION

Upon approval, please return three adopted copies of this letter to the Department of Public Works, Watershed Management Division.

Respectfully submitted,

Gail Farber

GAIL FARBER
Director

GF:ARG:sw

c: Chief Executive Office (Rochelle Goff)
County Counsel
Executive Office

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APPENDIX A.
GENERIC DEPTH-DAMAGE RELATIONSHIPS FOR RESIDENTIAL STRUCTURES

CECW-PG 10 October 2003

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Economic Guidance Memorandum (EGM) 04-01, Generic Depth-Damage Relationships for Residential Structures with Basements.

1. Purpose. The purpose of this memorandum is to release, and provide guidance for the use of, generic depth-damage curves for use in U.S. Army Corps of Engineers flood damage reduction studies.

2. Background. Proper planning and evaluation of flood damage reduction projects require knowledge of actual damage caused to various types of properties. The primary purpose of the Flood Damage Data Collection Program is to meet that requirement by providing Corps district offices with standardized relationships for estimating flood damage and other costs of flooding, based on actual losses from flood events. Under this program, data have been collected from major flooding that occurred in various parts of the United States from 1996 through 2001. Damage data collected are based on comprehensive accounting of losses from flood victims' records. The generic functions developed and provided in this EGM represent a substantive improvement over other generalized depth-damage functions such as the Flood Insurance Administration (FIA) Rate Reviews.

3. Results. Generic damage functions are attached for one-story homes with basement, two or more story homes with basement, and split-level homes with basement. Generic damage functions for similar structures without basements were published in 2000 and are included as enclosure 1 for ready reference.

a. Regression analysis was used to create the damage functions. While several independent variables, such as flood duration and flood warning lead-time, were examined in building the models, the models that were most efficient in explaining the percent damage to structure and contents were quadratic and cubic forms with depth as the only independent variable.

b. Content damage was modeled with the dependent variable being content damage as a percentage of structure value. This differs from the previous technique of first developing content valuations and then content damage relationships as a function of content valuations. The generic content damage models are statistically significant and their use eliminates the need to establish content-to-structure ratios through surveys.

c. While the data collected include information on all aspects of National Economic Development (NED) losses, only results and recommendations related to the structure and content damages for homes with basements are included in this EGM.

Direct costs for cleanup expenses, unpaid hours for cleanup and repair, emergency damage prevention actions, and other flood-related costs are not included in these damage functions. Information on other residential flood costs, beyond those included in these damage functions will found the summary report, discussed in paragraph 5. These costs should be developed using site-specific historical information.

4. Application. The following paragraphs provide information on the application of the generic curves within the HEC-FDA damage calculation program.

a. The economic section of HEC-FDA divides the quantification of flood damages into a direct method and an indirect method. The direct method allows the user to directly enter a stage-damage relationship for any structure. This approach is commonly used for large or unique properties such as industrial or pubic buildings. The indirect method quantifies the stage-damage relationship for a group of structures that have significant commonality. Typically damage to residential structures is calculated using the indirect method. The procedures described in the following paragraphs apply only when using the indirect method to determine the stage-damage relationship.

b. The traditional approach to quantifying damage to contents by the indirect method relies on three pieces of information: 1) structure value; 2) content-to-structure value ratio; and 3) the content depth-damage relationship. The content-to-structure value ratio and content depth-damage relationship are unique to the structure occupancy type to which a structure is assigned. The content depth-damage relationship provides the estimate of content flood damage as a percentage of content value. Thus, to calculate a content stage-damage function for an individual structure, the structure value for an individual structure is first multiplied by the content-to-structure value ratio to provide an estimate of the content value. This content value is then multiplied by each percent damage value of the content depth-damage relationship.

c. The new content depth-damage functions provided herein are different from those used by the Corps in the past in one important aspect. The new functions calculate content damage as a percent of structure value rather than content value. Using these functions within HEC-FDA requires care in specifying a content-to-structure value ratio. To understand the requirements for using the new content depth-damage functions requires a basic understanding of how HEC-FDA calculates content damage.

(1). To calculate damages by the indirect method, each structure must be assigned to a structure occupancy type. For each structure occupancy type a content-to-structure value ratio and content depth-damage relationship are defined. These data for calculating content damage within HEC-FDA is entered on the “Study Structure Occupancy Type” screen. As long as a content value is not entered for a structure in the Structure Inventory Data, HEC-FDA calculates the content stage-damage by first calculating content using the structure value multiplied by the content-to-structure value ratio.

In some instances, however, analysts develop unique estimates of content values for a structure, which are entered for the individual structure on the Structure Inventory Data screen. For each structure that has a content value entered, calculating a content value by using the content-to-structure value ratio is ignored and the user entered content value is used to calculate content damage.

(2). The new content depth-damage functions do not require this intermediate step of calculating content values. Therefore, the content-to-structure value ratio for each structure occupancy type using the new content depth-damage relationships must be set to one hundred percent (100). This forces the content depth-damage function to be multiplied by the structure value as required. Also, the "Error Associated with Content/Structure Value" on the "Study Structure Occupancy Type" screen should be left blank. This implies that the error in content-to-structure value ratio is part of the new content depth-damage relationship.

(3). Because entering a content value on the Structure Inventory Data window overrides the content-to-structure value ratio, the new content depth-damage relationships should not be used for structures that have separately entered content values.

(4). Questions concerning the use of the generic curves within the HEC-FDA model can be addressed to Dr. David Moser, Institute of Water Resources (IWR), (703) 428-8066.

5. Report. A report summarizing the data collection effort and analyses performed to derive these curves will shortly be available on the IWR website. More information may be obtained by contacting the program's principal investigator, Stuart Davis, (703) 428-7086.

6. Waiver to Policy. These curves are developed for nation-wide applicability in flood damage reduction studies. When using these curves, the requirement to develop site-specific depth-damage curves contained in ER 1105-2-100, E-19q.(2) is waived. Additionally, the requirement to develop content valuations and content-to-structure ratios based on site-specific or comparable floodplain information, ER 1005-2-100, E-19q.(1)(a), is also waived. Note these waivers currently apply only to single-family homes with and without basements for which generic curves have been published, and not other categories of flood inundation damages for which no generic curves exist. Feasibility reports must state the generic curves are being used in the flood damage analysis for residential structures with and/or without basements. Use of these curves is optional and analysts should always endeavor to use the best available information to accurately quantify the damages and benefits in inundation reduction studies.

7. Point of Contact. Administrators of the Flood Damage Data Collection Program continue to collect and analyze flood-related damages to both residential and commercial properties. The HQUSACE program monitor is Lillian Almodovar, (202) 761-4233, who can address any questions concerning the program.

FOR THE COMMANDER:

/s/

Encl

WILLIAM R. DAWSON, P.E.
Chief, Planning and Policy Division
Directorate of Civil Works

CECW-PG
SUBJECT: Economic Guidance Memorandum (EGM) 04-01, Generic Depth-Damage Relationships

DISTRIBUTION:
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DAMAGE FUNCTIONS FOR SINGLE FAMILY RESIDENTIAL STRUCTURES WITH BASEMENTS

Structure Depth-Damage

Table 1 Structure One Story, With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	0%	0
-7	0.7%	1.34
-6	0.8%	1.06
-5	2.4%	0.94
-4	5.2%	0.91
-3	9.0%	0.88
-2	13.8%	0.85
-1	19.4%	0.83
0	25.5%	0.85
1	32.0%	0.96
2	38.7%	1.14
3	45.5%	1.37
4	52.2%	1.63
5	58.6%	1.89
6	64.5%	2.14
7	69.8%	2.35
8	74.2%	2.52
9	77.7%	2.66
10	80.1%	2.77
11	81.1%	2.88
12	81.1%	2.88
13	81.1%	2.88
14	81.1%	2.88
15	81.1%	2.88
16	81.1%	2.88

Table 2 Structure Two or More Stories, With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	1.7%	2.70
-7	1.7%	2.70
-6	1.9%	2.11
-5	2.9%	1.80
-4	4.7%	1.66
-3	7.2%	1.56
-2	10.2%	1.47
-1	13.9%	1.37
0	17.9%	1.32
1	22.3%	1.35
2	27.0%	1.50
3	31.9%	1.75
4	36.9%	2.04
5	41.9%	2.34
6	46.9%	2.63
7	51.8%	2.89
8	56.4%	3.13
9	60.8%	3.38
10	64.8%	3.71
11	68.4%	4.22
12	71.4%	5.02
13	73.7%	6.19
14	75.4%	7.79
15	76.4%	9.84
16	76.4%	12.36

Table 3 Structure Split Level, With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8		
-7		
-6	2.5%	1.8%
-5	3.1%	1.6%
-4	4.7%	1.5%
-3	7.2%	1.6%
-2	10.4%	1.6%
-1	14.2%	1.6%
0	18.5%	1.6%
1	23.2%	1.7%
2	28.2%	1.9%
3	33.4%	2.1%
4	38.6%	2.4%
5	43.8%	2.6%
6	48.8%	2.9%
7	53.5%	3.2%
8	57.8%	3.4%
9	61.6%	3.6%
10	64.8%	3.9%
11	67.2%	4.2%
12	68.8%	4.8%
13	69.3%	5.7%
14	69.3%	5.7%
15	69.3%	5.7%
16	69.3%	5.7%

Content Depth-Damage

Table 4 Content One Story, With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	0.1%	1.60
-7	0.8%	1.16
-6	2.1%	0.92
-5	3.7%	0.81
-4	5.7%	0.78
-3	8.0%	0.76
-2	10.5%	0.74
-1	13.2%	0.72
0	16.0%	0.74
1	18.9%	0.83
2	21.8%	0.98
3	24.7%	1.17
4	27.4%	1.39
5	30.0%	1.60
6	32.4%	1.81
7	34.5%	1.99
8	36.3%	2.13
9	37.7%	2.25
10	38.6%	2.35
11	39.1%	2.45
12	39.1%	2.45
13	39.1%	2.45
14	39.1%	2.45
15	39.1%	2.45
16	39.1%	2.45

Table 5 Content Two or More Stories-With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	0%	0
-7	1.0%	2.27
-6	2.3%	1.76
-5	3.7%	1.49
-4	5.2%	1.37
-3	6.8%	1.29
-2	8.4%	1.21
-1	10.1%	1.13
0	11.9%	1.09
1	13.8%	1.11
2	15.7%	1.23
3	17.7%	1.43
4	19.8%	1.67
5	22.0%	1.92
6	24.3%	2.15
7	26.7%	2.36
8	29.1%	2.56
9	31.7%	2.76
10	34.4%	3.04
11	37.2%	3.46
12	40.0%	4.12
13	43.0%	5.08
14	46.1%	6.39
15	49.3%	8.08
16	52.6%	10.15

Table 6 Content Split-Level-With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	0.6%	2.09
-7	0.7%	1.49
-6	1.4%	1.14
-5	2.4%	1.01
-4	3.8%	1.00
-3	5.4%	1.02
-2	7.3%	1.03
-1	9.4%	1.04
0	11.6%	1.06
1	13.8%	1.12
2	16.1%	1.23
3	18.2%	1.38
4	20.2%	1.57
5	22.1%	1.76
6	23.6%	1.95
7	24.9%	2.13
8	25.8%	2.28
9	26.3%	2.44
10	26.3%	2.44
11	26.3%	2.44
12	26.3%	2.44
13	26.3%	2.44
14	26.3%	2.44
15	26.3%	2.44
16	26.3%	2.44

ENCLOSURE
DAMAGE FUNCTIONS
FOR SINGLE FAMILY RESIDENTIAL

STRUCTURES WITHOUT BASEMENTS

Structure One Story, No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	2.5%	2.7%
0	13.4%	2.0%
1	23.3%	1.6%
2	32.1%	1.6%
3	40.1%	1.8%
4	47.1%	1.9%
5	53.2%	2.0%
6	58.6%	2.1%
7	63.2%	2.2%
8	67.2%	2.3%
9	70.5%	2.4%
10	73.2%	2.7%
11	75.4%	3.0%
12	77.2%	3.3%
13	78.5%	3.7%
14	79.5%	4.1%
15	80.2%	4.5%
16	80.7%	4.9%

Structure Two or More Stories-No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	3.0%	4.1%
0	9.3%	3.4%
1	15.2%	3.0%
2	20.9%	2.8%
3	26.3%	2.9%
4	31.4%	3.2%
5	36.2%	3.4%
6	40.7%	3.7%
7	44.9%	3.9%
8	48.8%	4.0%
9	52.4%	4.1%
10	55.7%	4.2%
11	58.7%	4.2%
12	61.4%	4.2%
13	63.8%	4.2%
14	65.9%	4.3%
15	67.7%	4.6%
16	69.2%	5.0%

Structure Split-Level-No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	6.4%	2.9%
0	7.2%	2.1%
1	9.4%	1.9%
2	12.9%	1.9%
3	17.4%	2.0%
4	22.8%	2.2%
5	28.9%	2.4%
6	35.5%	2.7%
7	42.3%	3.2%
8	49.2%	3.8%
9	56.1%	4.5%
10	62.6%	5.3%
11	68.6%	6.0%
12	73.9%	6.7%
13	78.4%	7.4%
14	81.7%	7.9%
15	83.8%	8.3%
16	84.4%	8.7%

Content One Story, No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	2.4%	2.1%
0	8.1%	1.5%
1	13.3%	1.2%
2	17.9%	1.2%
3	22.0%	1.4%
4	25.7%	1.5%
5	28.8%	1.6%
6	31.5%	1.6%
7	33.8%	1.7%
8	35.7%	1.8%
9	37.2%	1.9%
10	38.4%	2.1%
11	39.2%	2.3%
12	39.7%	2.6%
13	40.0%	2.9%
14	40.0%	3.2%
15	40.0%	3.5%
16	40.0%	3.8%

Content Two or More Stories-No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	1.0%	3.5%
0	5.0%	2.9%
1	8.7%	2.6%
2	12.2%	2.5%
3	15.5%	2.5%
4	18.5%	2.7%
5	21.3%	3.0%
6	23.9%	3.2%
7	26.3%	3.3%
8	28.4%	3.4%
9	30.3%	3.5%
10	32.0%	3.5%
11	33.4%	3.5%
12	34.7%	3.5%
13	35.6%	3.5%
14	36.4%	3.6%
15	36.9%	3.8%
16	37.2%	4.2%

Content Split-Level-No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	2.2%	2.2%
0	2.9%	1.5%
1	4.7%	1.2%
2	7.5%	1.3%
3	11.1%	1.4%
4	15.3%	1.5%
5	20.1%	1.6%
6	25.2%	1.8%
7	30.5%	2.1%
8	35.7%	2.5%
9	40.9%	3.0%
10	45.8%	3.5%
11	50.2%	4.1%
12	54.1%	4.6%
13	57.2%	5.0%
14	59.4%	5.4%
15	60.5%	5.7%
16	60.5%	6.0%

APPENDIX B.
PUBLIC OUTREACH MATERIALS

APPENDIX B.
PUBLIC OUTREACH MATERIALS

SUMMARY OF SURVEY RESULTS

About the Survey

The Los Angeles County Department of Public Works developed and disseminated a 33-question online survey to assist with the incorporation of public outreach in its 2015 Comprehensive Floodplain Management Plan. The survey was available through a link on the County website. In addition to multiple choice questions, Los Angeles County residents were offered the opportunity to provide additional information and detail through several open response sections, the majority of which were associated with a closed response question to ensure as much detail as possible. The survey, completed by 136 County residents, sought to determine public awareness and perception on several flood-related issues, including:

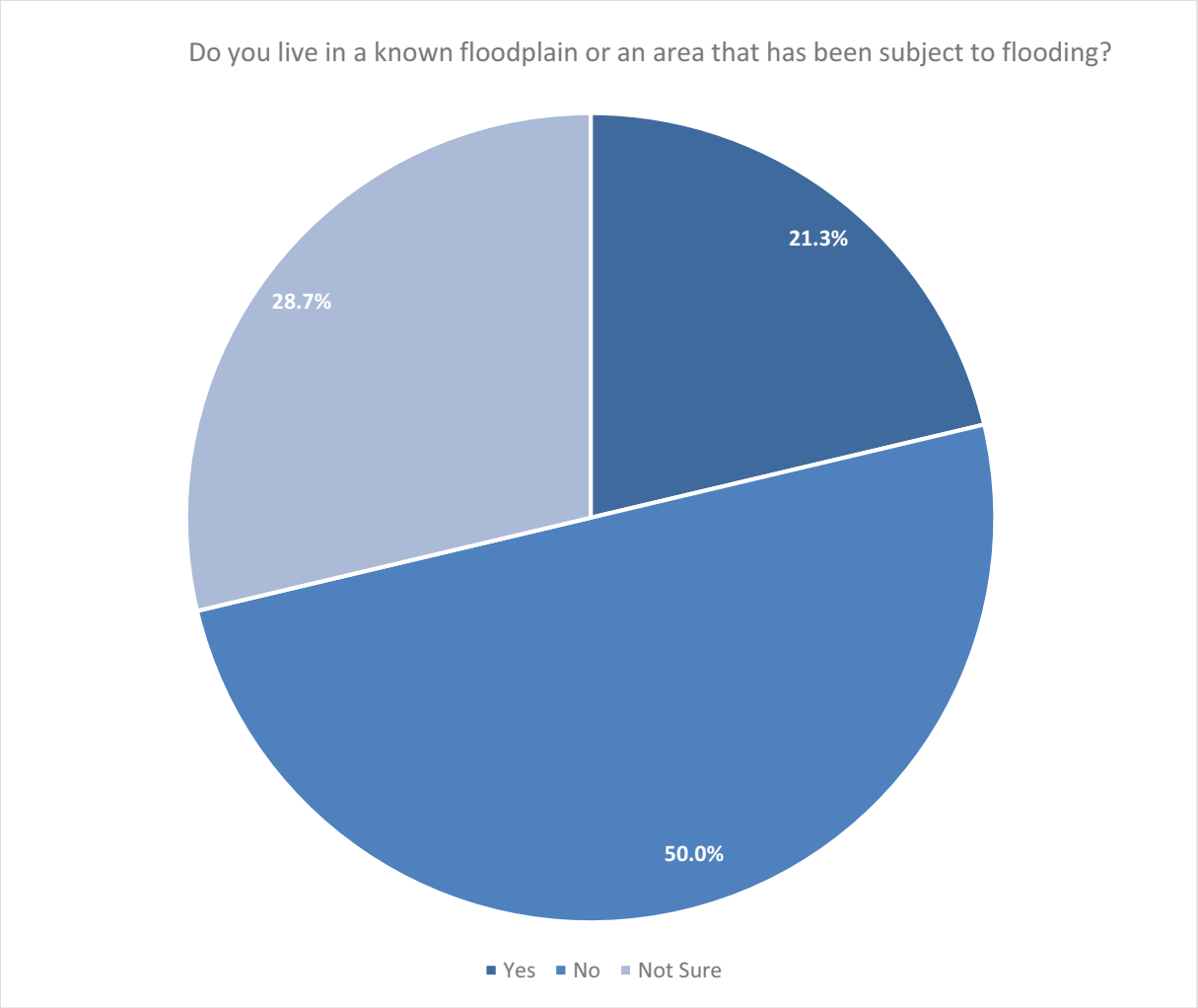
- Flood Hazards
- Flood Preparedness and Education
- Flood Control and Risk Reduction Measures

About the Survey Respondents

As noted above, 136 residents provided information via the survey to enhance the 2015 Comprehensive Floodplain Management Plan. All respondents were over the age of 18, and the number of responses per age group divided into a fairly even distribution (Question 27). While the majority of respondents were male (64.1 percent), women still provided a sizeable contribution of responses (Question 28). The majority of respondents had at least some college experience, if not a degree or graduate degree (combined total of 97.2 percent) (Question 29). Nine of the respondents also identified themselves as having a special access or functional need, alerting the County to their need for early warning or specialized response during a disaster event (Question 26).

The survey respondents were from a wide geographical range, representing 64 different ZIP codes (Question 2). Additionally, the majority of respondents were homeowners (80.9 percent) and not renters (Question 4). In Question 30, residents noted how long they had lived at their current property, with the largest response at 1 to 5 years (36.2 percent), followed by more than 20 years (21.9 percent), and then 11 to 20 years (18.1 percent). Of the respondents who definitely live in the floodplain, 25 percent indicated that the presence of a flood hazard was not disclosed to them prior to the purchase of their home (Question 18). Over 20 percent of respondents believe they live in a known floodplain or area subject to flooding, per Question 3. Of all respondents whose addresses could be geo-located for confirmation, 10.8 percent live in a known floodplain. Therefore, 65.5 percent of respondents who responded “yes” were unable to be confirmed as mapped floodplain residents.

The high percentage of residents who stated that they live in flood prone areas suggests several possibilities – (1) residents may be vulnerable to stormwater-flooding or flood-related hazards which can occur outside the floodplain, (2) current mapped floodplain boundaries may not accurately reflect changes in development or land use, or (3) residents would benefit from a public education and outreach program on flood zones and floodplains.



In the same question, respondents also provided feedback on areas that have experienced flooding, as well as different flood problems. While most flood instances were relatively minor (dirt and mud on roads after hard rains, minimal roadway easement runoff) or due to older infrastructure, including storm drains with insufficient capacity, some residents listed more severe problems. One person was not able to get home from their job in Burbank for over a week when Avenues J to T flooded from El Nino rains. Another shared that there is no flood control structure for a mile above their home in Altadena, resulting in their home routinely flooding.

Several residents also used the open response areas in the survey to request an evaluation of whether their home is located in the floodplain. Comments have indicated that, either due to a higher elevation or lack of flooding during their time of residency, their homes may not have the appropriate flood risk applied.

Perception of Flood Hazards

Question 12 asked respondents to rank how concerned they are about flood-related hazards in Los Angeles County, including hazards such as climate change impacts, tsunami, groundwater flooding, coastal flooding, river/channel migration, stream bank erosion, coastal erosion, urban flooding/drainage issues, land subsidence, and mudflow hazards.

Residents identified urban flooding/drainage issues as the hazard that they were most concerned, very concerned, or extremely concerned about (with 40.4 percent of residents indicating one of those levels). Climate change impacts were the second highest concern (with 35.6 percent concerned or higher), and mudflow hazards were the third highest concern (with 33.9 percent concerned or higher). Climate change and mudflow hazards were also selected as the two hazards where the most respondents indicated extremely concerned (5.8 percent and 4.1 percent, respectively, compared to other concern levels). Some respondents also identified other flood-related hazards, including heavy rains, earthquakes, the California aqueduct failure, and burn areas flooding after severe storms. California aqueduct failure was listed by two respondents, while the other hazards were only listed once.

Flood Preparedness and Education

Survey respondents were also asked a series of questions to gauge their level of preparedness and how they would like to receive preparedness/outreach information. When asked how prepared their household was in Question 9, 40.6 percent indicated feeling somewhat prepared. Only 10.4 percent felt either well prepared or very well prepared. In Question 24, where residents were asked to indicate how they felt about the statement, "Information about the risks associated with flood hazards is readily available and easy to locate," 41.4 percent disagreed or strongly disagreed. These responses suggest that a potential area for the County to strengthen their flood management program to be helping residents understand where they can go to learn more about flood hazards and risk. Since 48.6 percent of respondents strongly agree (along with 30.5 percent of respondents somewhat agreeing) that it is one's personal responsibility to educate themselves about flood risks, such a program should be well-received by residents (Question 23).

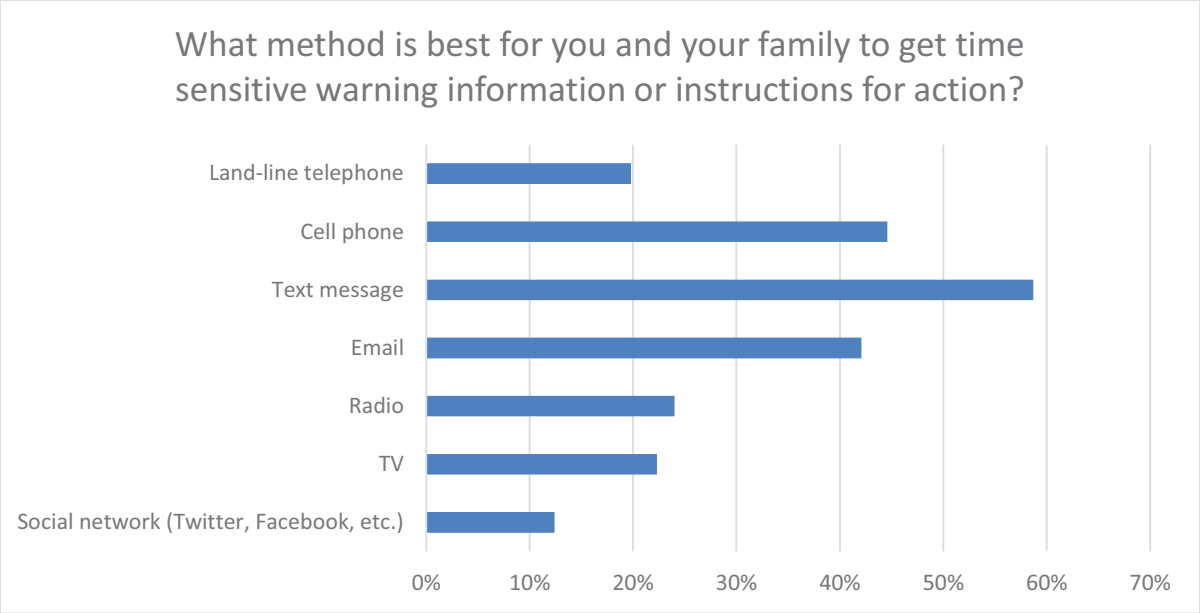
In Question 10, respondents checked all the sources that they believe to have provided them with useful information to prepare for a flood event. Federal, state, or local emergency management (45.6 percent) was the most frequent source. The other main sources of information included locally-provided news or media (29.8 percent) and personal experience (20.2 percent). Several respondents indicated work as an "other" source, and 25.4 percent did not use any information source.

Respondents additionally identified the top five methods they thought to be most effective in providing flood hazard information (Question 13), along with their preferred contact means for an emergency alert (Question 14). The top five flood information methods were:

- Internet (52.1 percent)
- TV News (47.9 percent)
- Radio News (43.8 percent)
- Public Awareness Campaign, e.g., Flood Awareness Week, Winter Storm Preparedness Month (32.2. percent)
- Social Media, e.g., Twitter, Facebook, etc. (32.2 percent)

Public Meetings, Local Government Newsletters, and the Newspaper also ranked at over 20 percent. The Chamber of Commerce and the Telephone Book were the lowest ranked, at 0.0 percent and 0.8 percent, respectively.

In regards to emergency alerts, respondents most preferred text messages (58.7 percent), cell phones (44.6 percent), and email (42.1 percent). Respondents also suggested amateur radio, US mail, and Community Emergency Response Team (CERT) networks as alternate contact methods beyond those listed by the County.

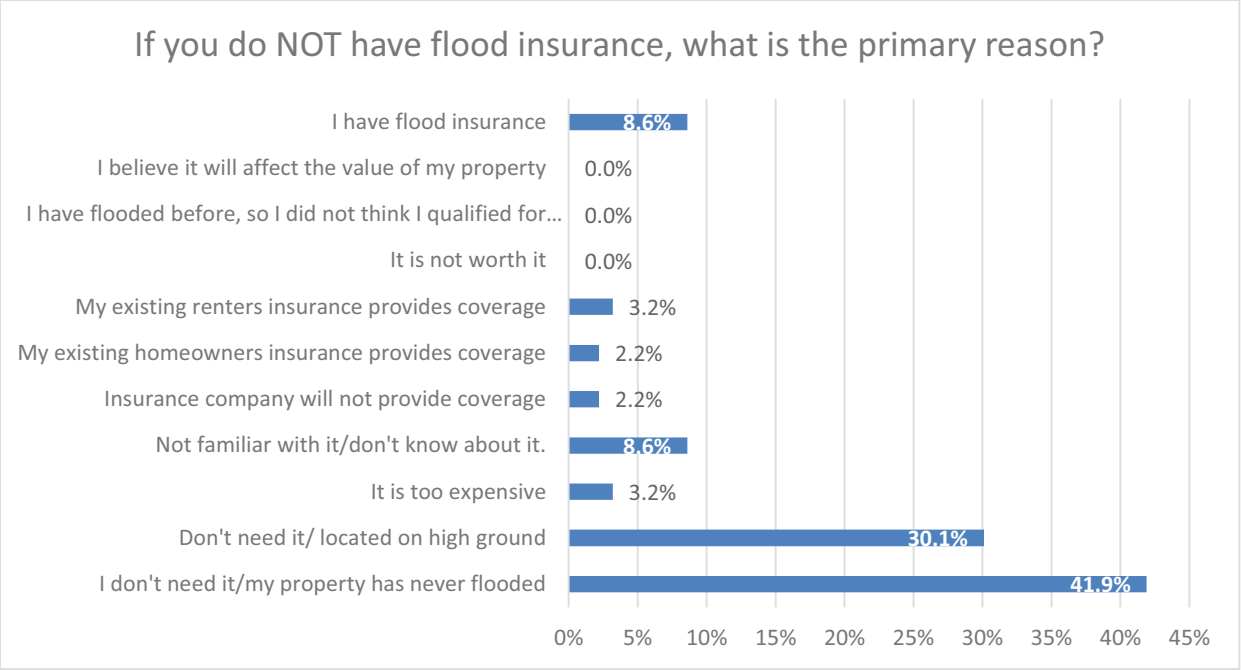


Flood Control and Risk Reduction Measures

Respondents had the opportunity to comment on different flood control and management measures, including both personal/residential activities and County-managed activities.

Flood Insurance

The National Flood Insurance Program (NFIP) is one of the more well-known flood risk management programs in place. Question 15 evaluated how many respondents have flood insurance, with 14.9 percent of respondents answering yes, 69.4 with no, and 15.7 percent as not sure. Most respondents that do not have flood insurance said that this is due to not needing it (property never having flooded) (41.9 percent) or not needing it (property located at high ground) (30.1 percent) (Question 16). Other reasons listed included an inability to afford more insurance, living on the 2nd floor, and not being sure how to tell whether homeowners insurance includes flood insurance. Some residents used the open response portion of this question to request clarification on their flood zone risk and whether they were required to have it, similar to in Question 3.



Government-Sponsored Programs

In Question 22, respondents indicated whether they believed that the government (local, state, and federal) has the responsibility to provide education and programs promoting citizen action to reduce exposure to risks associated with flood hazard. The response was positive, with 33.3 percent strongly agreeing and 37.1 percent somewhat agreeing. In Question 21, respondents ranked the types of government-sponsored projects they support in the following order:

- Retrofitting infrastructure (improving culverts, bridges, and local drainage)
- Capital projects (dams, levees, floodwalls, and drainage improvements)
- Providing better flood risk information to the public
- Strengthening codes and regulations to higher regulatory standards
- Acquiring vulnerable properties and maintaining them as open space
- Assisting vulnerable property owners with securing mitigation funding
- Other measures (including raising flood insurance rates for repetitive loss properties and updated flood maps)

At a personal level, most respondents were not sure (39.2 percent) how much they would be willing to spend to retrofit their homes against flood disasters (Question 6). Of those willing to invest in retrofitting their homes, 7.8 percent would spend $10,000 or more, 4.9 percent would spend $5,000 to $9,999, 12.7 percent would spend $1,000 to $4,999, and 7.8 percent would spend less than $1,000. The most popular incentive to retrofit, as identified in Question 7, was grant funding (62.4 percent), with low-interest rate home improvement loans (27.7 percent) and none (24.8 percent) scoring close together. Other suggested incentives included tax deductions, removal of flood insurance requirements, and budgeting for the entity that maintains a local flood channel.

SURVEY RESPONSES AND CHARTS

Question 1

What is your home address?		
Answer Options	**Response Percent**	**Response Count**
Street Address	99.0%	102
City	100.0%	103
	answered question	**103**
	skipped question	**33**

Question 2

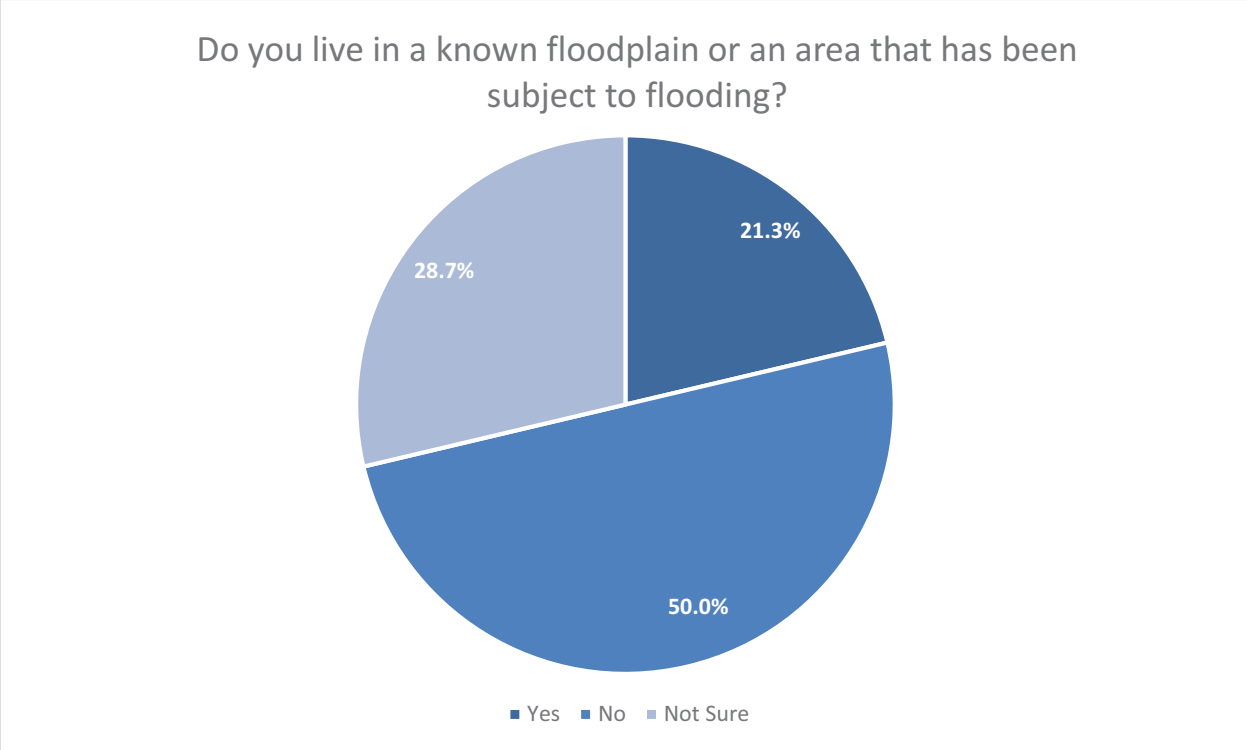
What is your zip code?			
Answer Options	**Response Average**	**Response Total**	**Response Count**
Zip Code	N/A	N/A	128
		answered question	**128**
		skipped question	**8**

ZIP Code	Number of Respondents	Percent of Total	ZIP Code	Number of Respondents	Percent of Total
90005	1	1.56%	91301	7	10.94%
90022	1	1.56%	91302	2	3.13%
90027	1	1.56%	91304	1	1.56%
90034	1	1.56%	91324	3	4.69%
90046	1	1.56%	91364	1	1.56%
90069	1	1.56%	91387	2	3.13%
90230	1	1.56%	91390	4	6.25%
90245	1	1.56%	91501	1	1.56%
90265	1	1.56%	91702	1	1.56%
90270	1	1.56%	91724	1	1.56%
90272	1	1.56%	91745	1	1.56%
90275	1	1.56%	91754	2	3.13%
90501	1	1.56%	91765	2	3.13%
90504	1	1.56%	91780	1	1.56%
90604	1	1.56%	91784	1	1.56%
90606	2	3.13%	91789	2	3.13%
90650	1	1.56%	91791	2	3.13%
90731	1	1.56%	91801	1	1.56%
90815	2	3.13%	91803	1	1.56%
90909	1	1.56%	92503	1	1.56%
91001	9	14.06%	92647	1	1.56%
91006	2	3.13%	93455	1	1.56%
91016	1	1.56%	93510	4	6.25%
91020	1	1.56%	93535	3	4.69%
91030	2	3.13%	93536	3	4.69%
91040	1	1.56%	93544	20	31.25%
91101	1	1.56%	93551	1	1.56%
91103	1	1.56%	93552	1	1.56%
91104	4	6.25%	93553	1	1.56%
91107	2	3.13%	93560	1	1.56%
91206	1	1.56%	93591	6	9.38%
91208	1	1.56%	93644	1	1.56%

Question 3

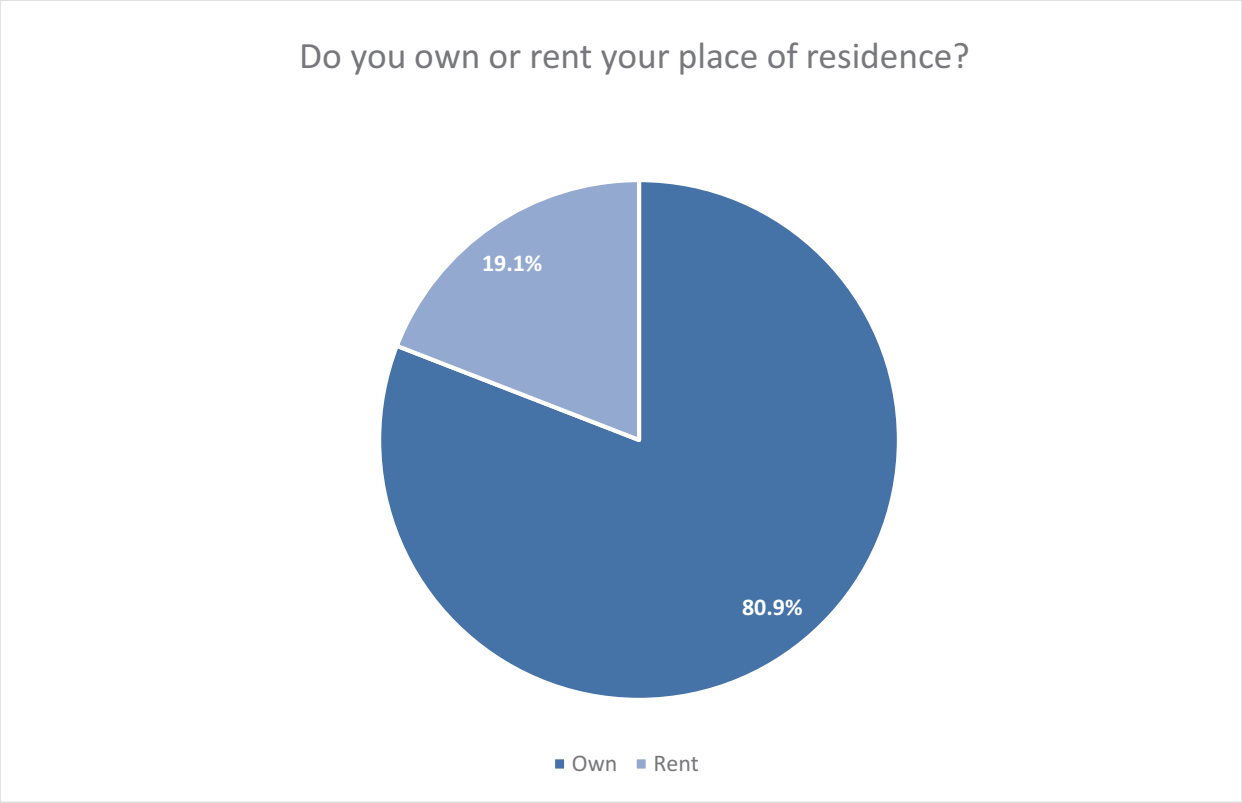
Do you live in a known floodplain or an area that has been subject to flooding?		
Answer Options	**Response Percent**	**Response Count**
Yes	21.3%	29
No	50.0%	68
Not Sure	28.7%	39
Please describe any experiences you have had with flooding at your current residence:		63
answered question		**136**
skipped question		**0**

Note: Responses above are based on respondents' personal knowledge and perception. In contrast, based on geo-located addresses, 10.8 percent of respondents live in a known floodplain. 34.5 percent of respondents who indicated "yes" correctly identified themselves as living in the floodplain. The other 65.5 percent were either incorrect, did not provide their addresses, live in addresses that could not be geo-located or live in areas that are not mapped floodplains. Only 1.5 percent of respondents who indicated "no" incorrectly identified themselves as not living in the floodplain. All respondents who selected "not sure" either do not live in the floodplain or had addresses that could not be geo-located for confirmation. 72 percent of respondents provided addresses that could be geo-located to confirm location in relation to the mapped floodplain.



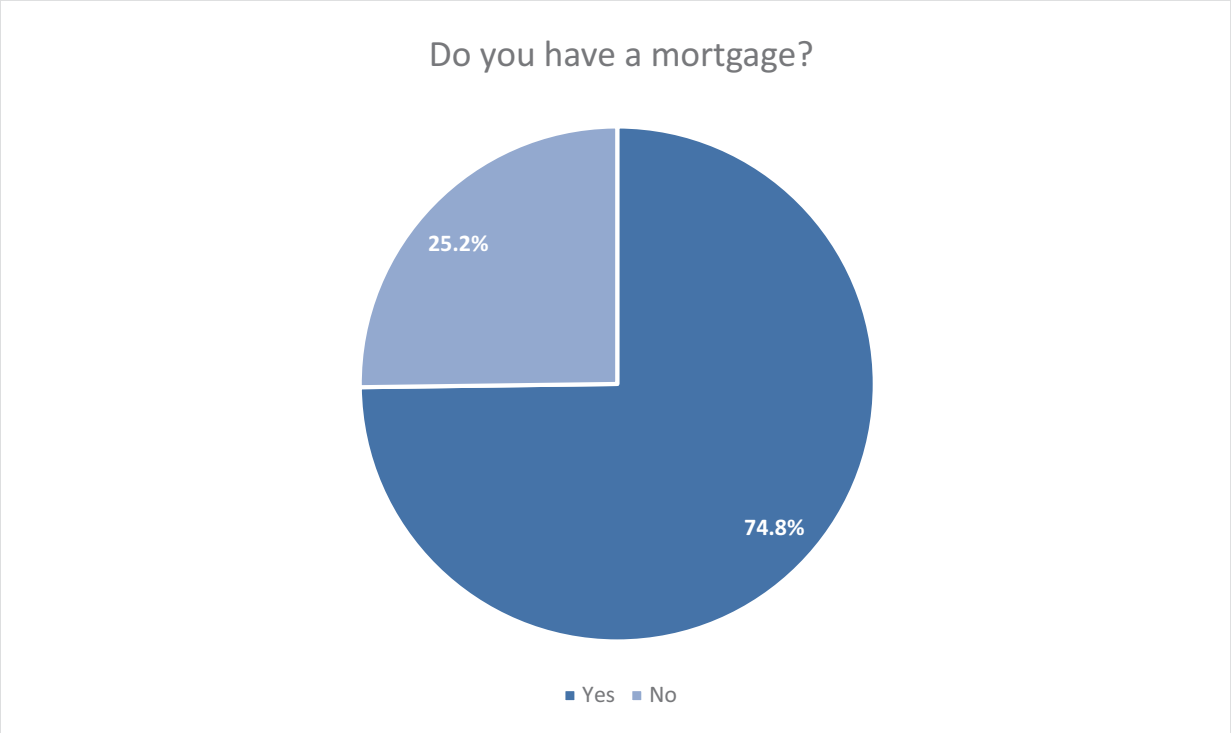
Question 4

Do you own or rent your place of residence?		
Answer Options	**Response Percent**	**Response Count**
Own	80.9%	110
Rent	19.1%	26
	answered question	**136**
	skipped question	**0**



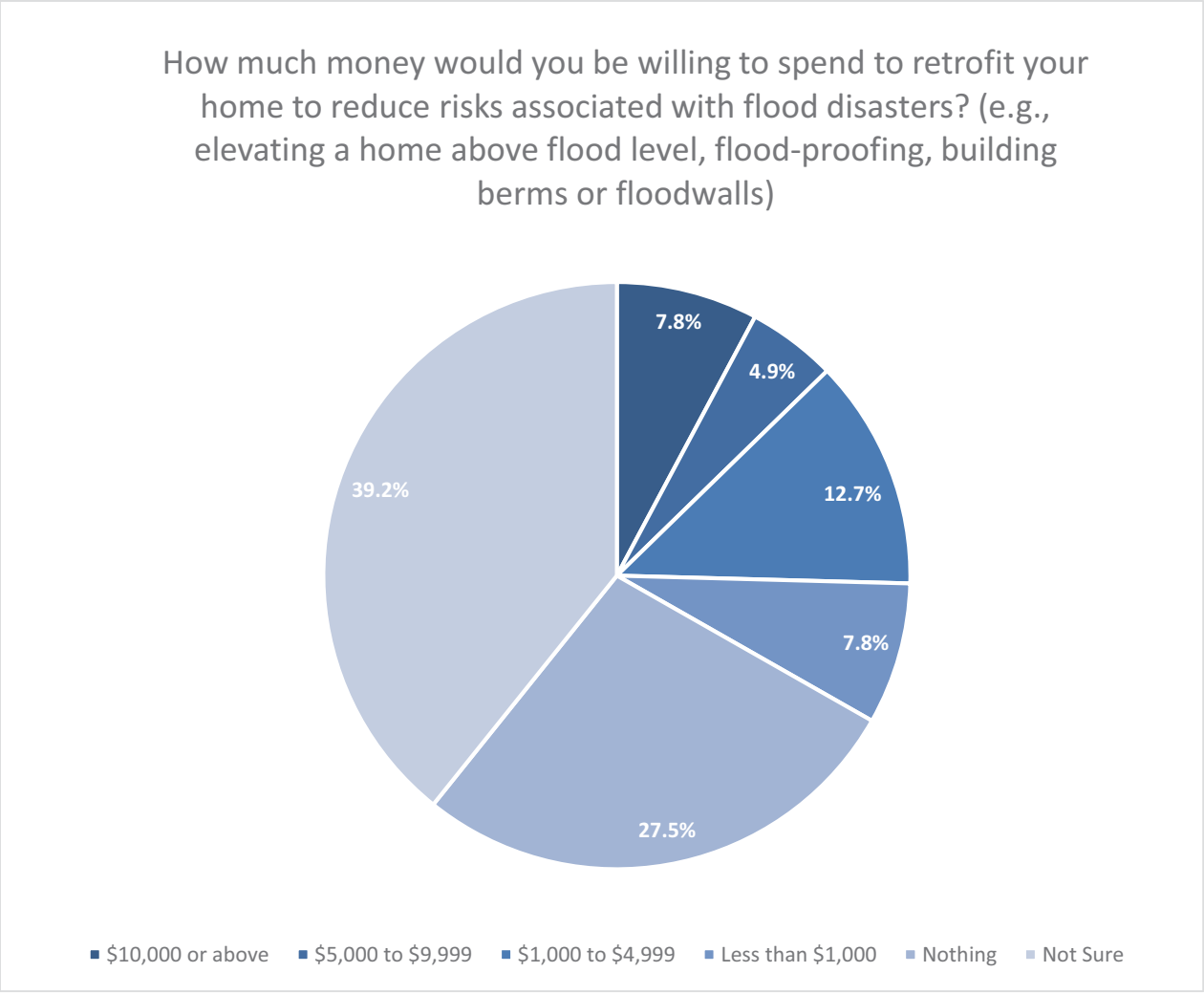
Question 5

Do you have a mortgage?		
Answer Options	**Response Percent**	**Response Count**
Yes	74.8%	80
No	25.2%	27
	answered question	**107**
	skipped question	**29**



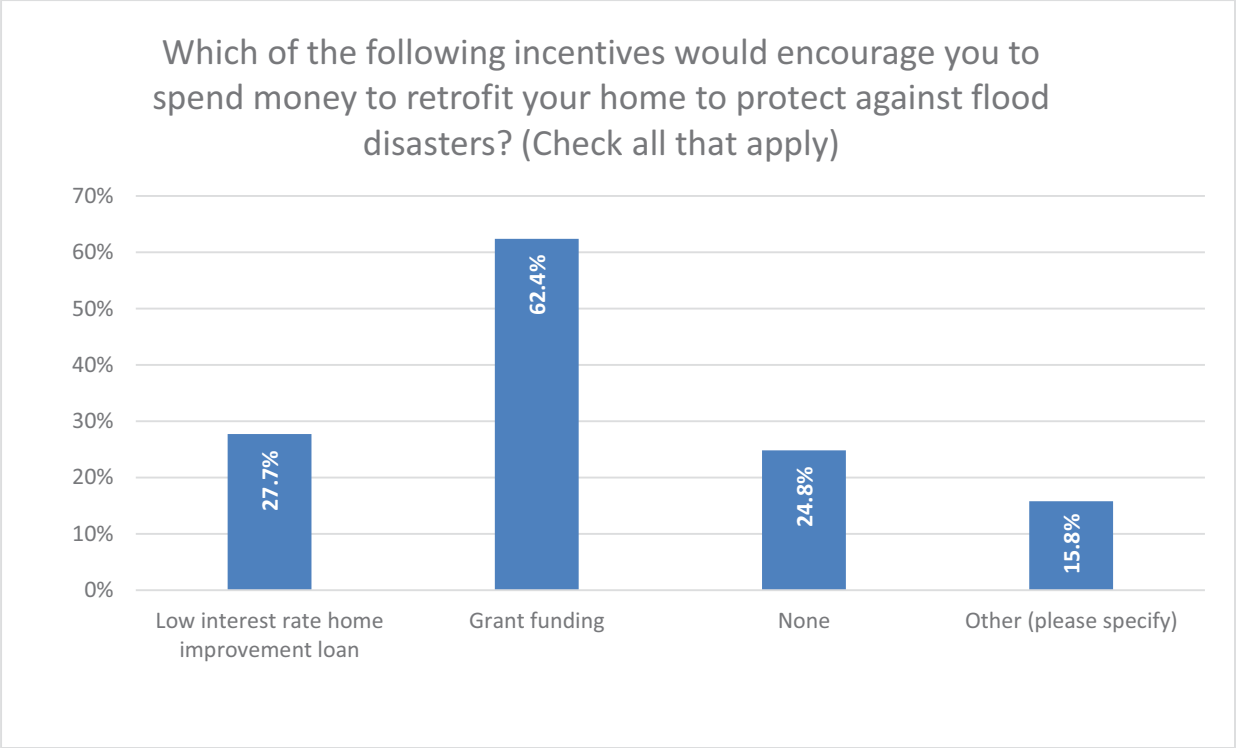
Question 6

How much money would you be willing to spend to retrofit your home to reduce risks associated with flood disasters? (e.g., elevating a home above flood level, flood-proofing, building berms or floodwalls)		
Answer Options	**Response Percent**	**Response Count**
$10,000 or above	7.8%	8
$5,000 to $9,999	4.9%	5
$1,000 to $4,999	12.7%	13
Less than $1,000	7.8%	8
Nothing	27.5%	28
Not Sure	39.2%	40
	answered question	**102**
	skipped question	**34**



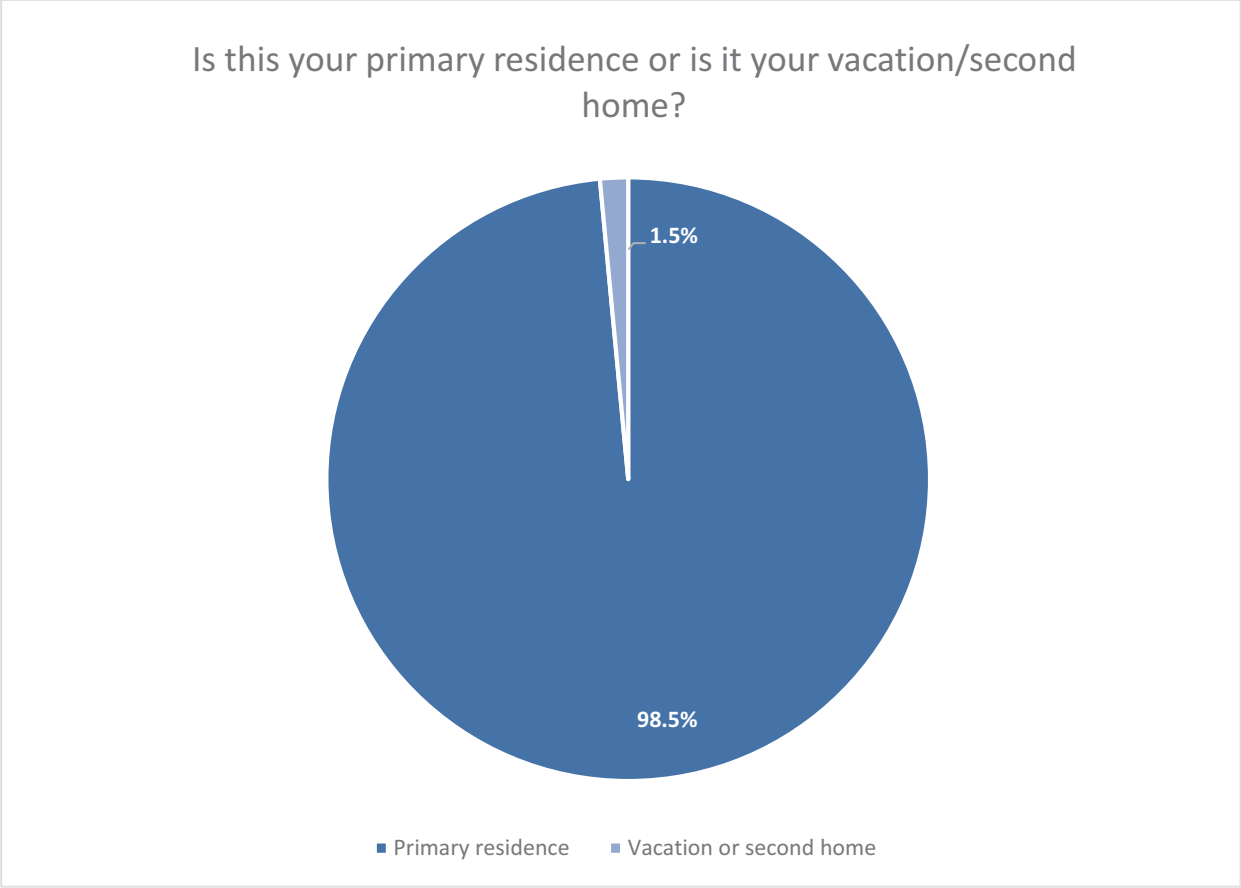
Question 7

Which of the following incentives would encourage you to spend money to retrofit your home to protect against flood disasters? (Check all that apply)		
Answer Options	**Response Percent**	**Response Count**
Low interest rate home improvement loan	27.7%	28
Grant funding	62.4%	63
None	24.8%	25
Other (please specify)	15.8%	16
	answered question	**101**
	skipped question	**35**



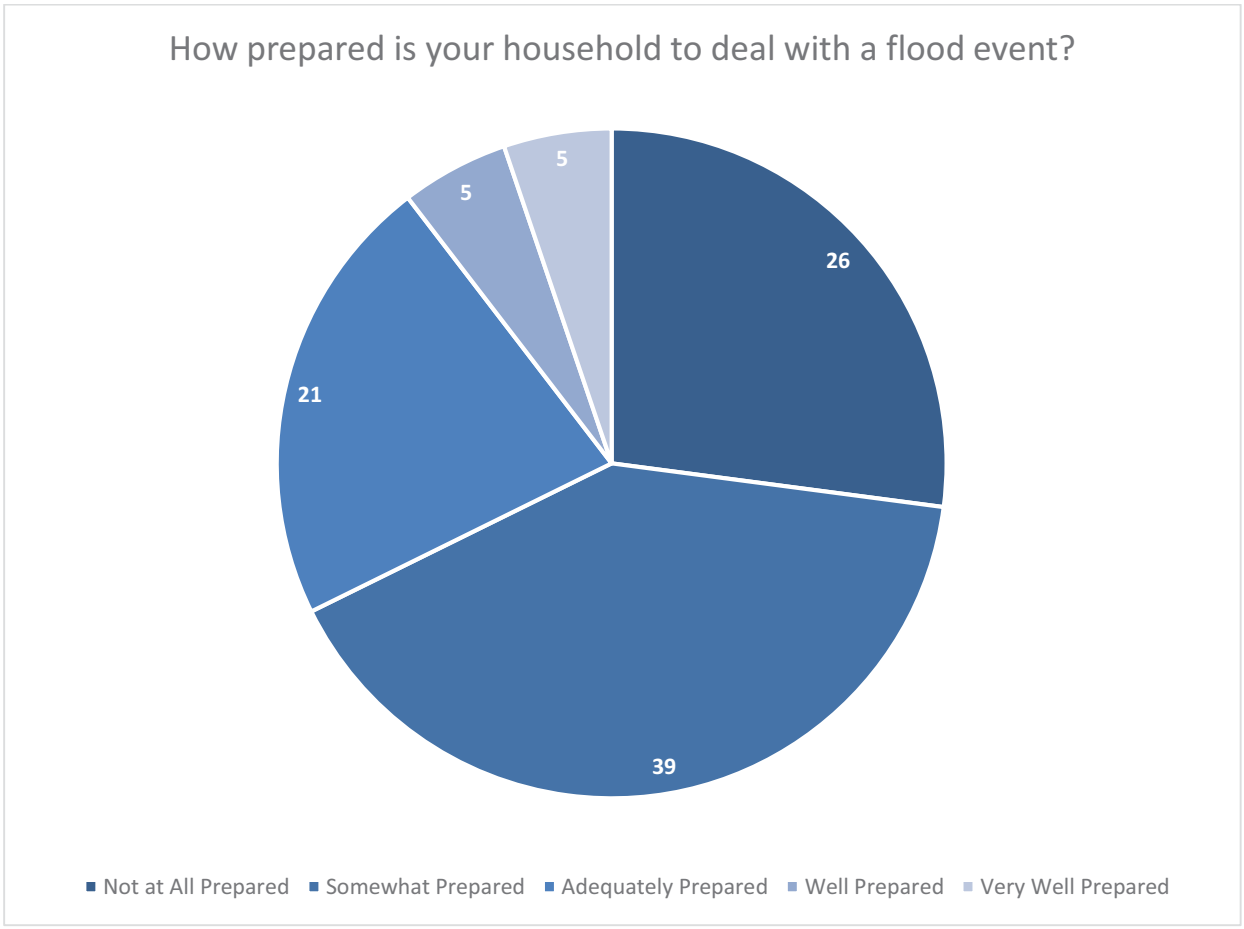
Question 8

Is this your primary residence or is it your vacation/second home?		
Answer Options	**Response Percent**	**Response Count**
Primary residence	98.5%	131
Vacation or second home	1.5%	2
	answered question	**133**
	skipped question	**3**



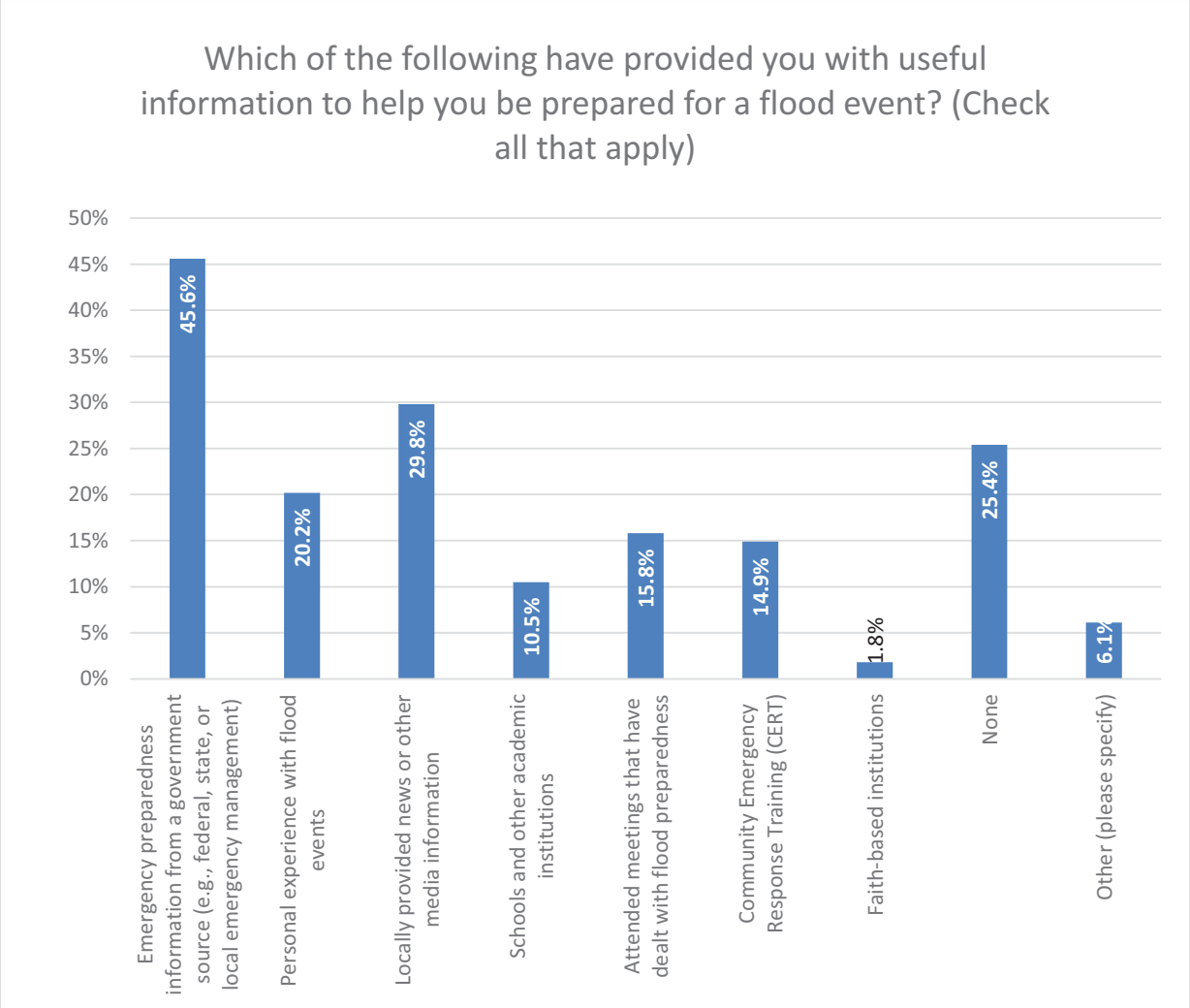
Question 9

How prepared is your household to deal with a flood event?							
Answer Options	**Not at All Prepared**	**Somewhat Prepared**	**Adequately Prepared**	**Well Prepared**	**Very Well Prepared**	**Rating Average**	**Response Count**
Check one (Count):	26	39	21	5	5	2.21	96
Percent:	27%	41%	22%	5%	5%		
					answered question		**96**
					skipped question		**40**



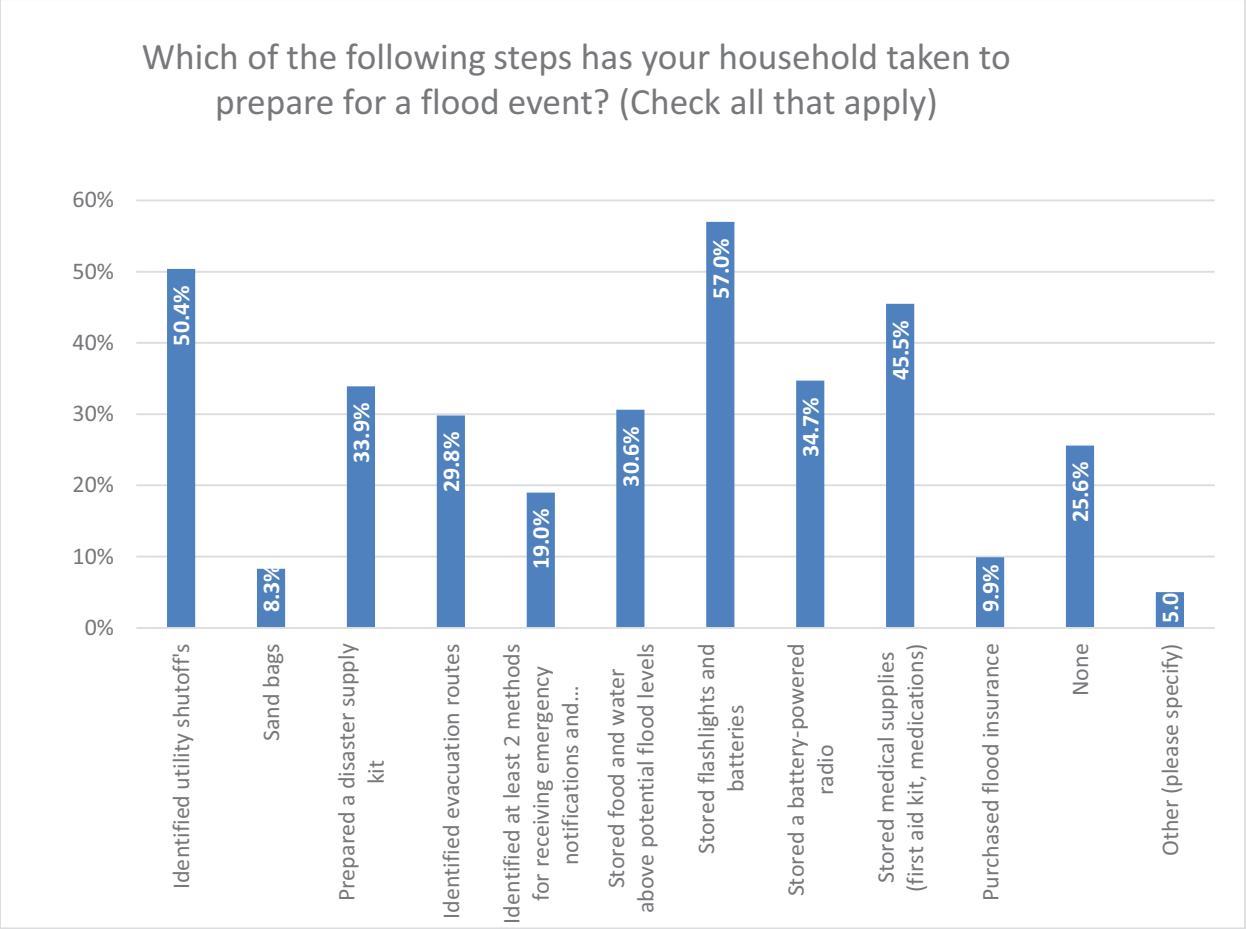
Question 10

Which of the following have provided you with useful information to help you be prepared for a flood event? (Check all that apply)		
Answer Options	**Response Percent**	**Response Count**
Emergency preparedness information from a government source (e.g., federal, state, or local emergency management)	45.6%	52
Personal experience with flood events	20.2%	23
Locally provided news or other media information	29.8%	34
Schools and other academic institutions	10.5%	12
Attended meetings that have dealt with flood preparedness	15.8%	18
Community Emergency Response Training (CERT)	14.9%	17
Faith-based institutions	1.8%	2
None	25.4%	29
Other (please specify)	6.1%	7
	answered question	**114**
	skipped question	**22**



Question 11

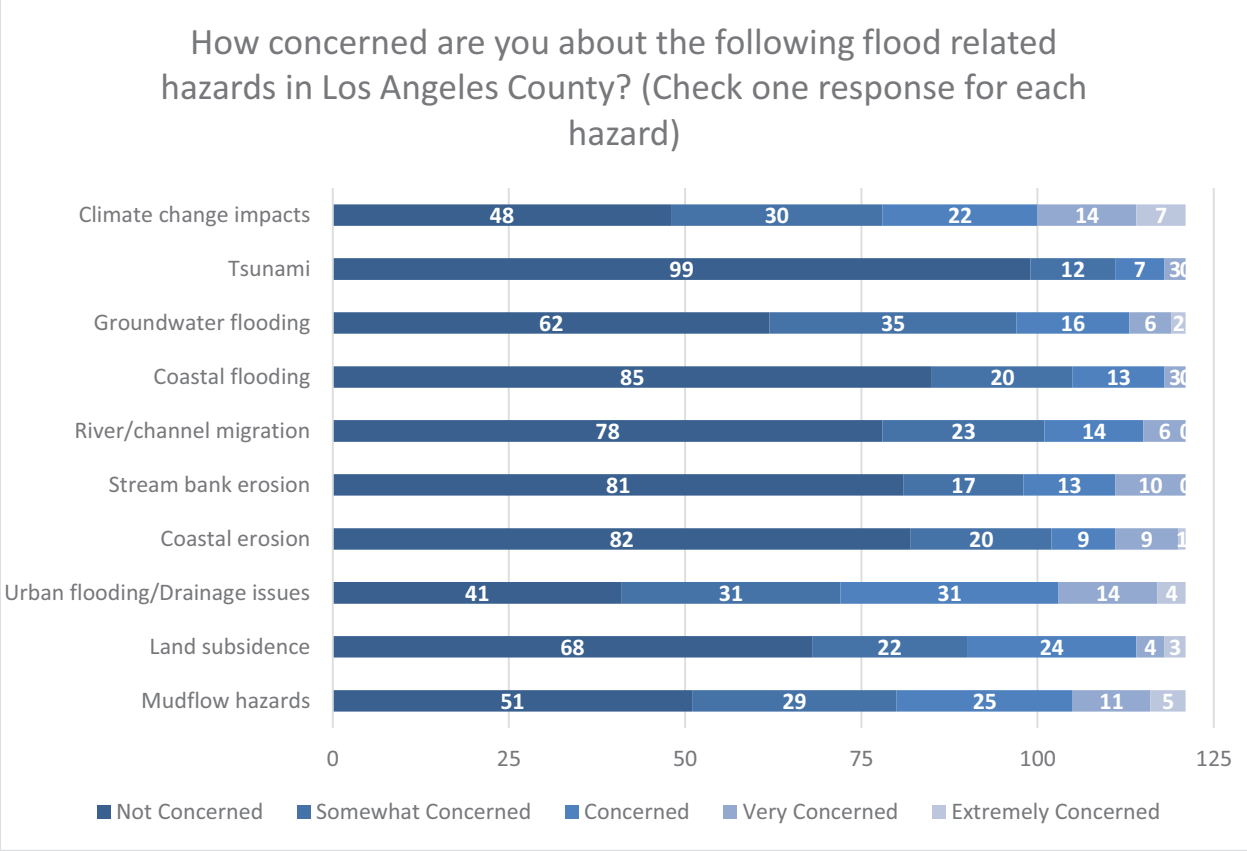
Which of the following steps has your household taken to prepare for a flood event? (Check all that apply)		
Answer Options	**Response Percent**	**Response Count**
Identified utility shutoff's	50.4%	61
Sand bags	8.3%	10
Prepared a disaster supply kit	33.9%	41
Identified evacuation routes	29.8%	36
Identified at least 2 methods for receiving emergency notifications and information during emergencies	19.0%	23
Stored food and water above potential flood levels	30.6%	37
Stored flashlights and batteries	57.0%	69
Stored a battery-powered radio	34.7%	42
Stored medical supplies (first aid kit, medications)	45.5%	55
Purchased flood insurance	9.9%	12
None	25.6%	31
Other (please specify)	5.0%	6
	answered question	**121**
	skipped question	**15**



Question 12

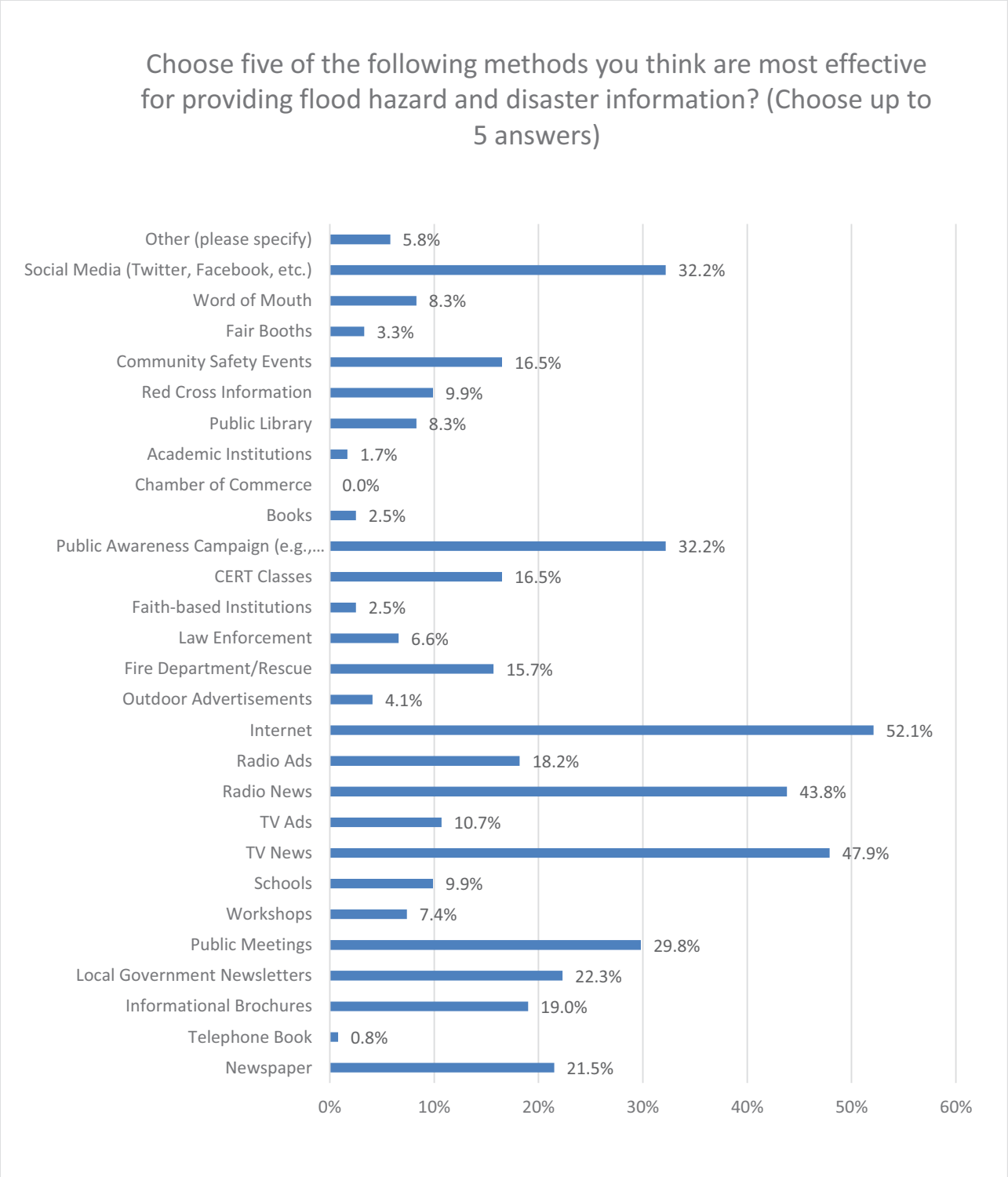
How concerned are you about the following flood related hazards in Los Angeles County? (Check one response for each hazard)

Answer Options	Not Concerned	Somewhat Concerned	Concerned	Very Concerned	Extremely Concerned	Rating Average	Response Count
Climate change impacts	48	30	22	14	7	2.19	121
Tsunami	99	12	7	3	0	1.29	121
Groundwater flooding	62	35	16	6	2	1.77	121
Coastal flooding	85	20	13	3	0	1.45	121
River/channel migration	78	23	14	6	0	1.57	121
Stream bank erosion	81	17	13	10	0	1.60	121
Coastal erosion	82	20	9	9	1	1.57	121
Urban flooding/Drainage issues	41	31	31	14	4	2.25	121
Land subsidence	68	22	24	4	3	1.78	121
Mudflow hazards	51	29	25	11	5	2.09	121
Other (Please specify other flood-related hazard and level of concern)							6
						answered question	**121**
						skipped question	**15**



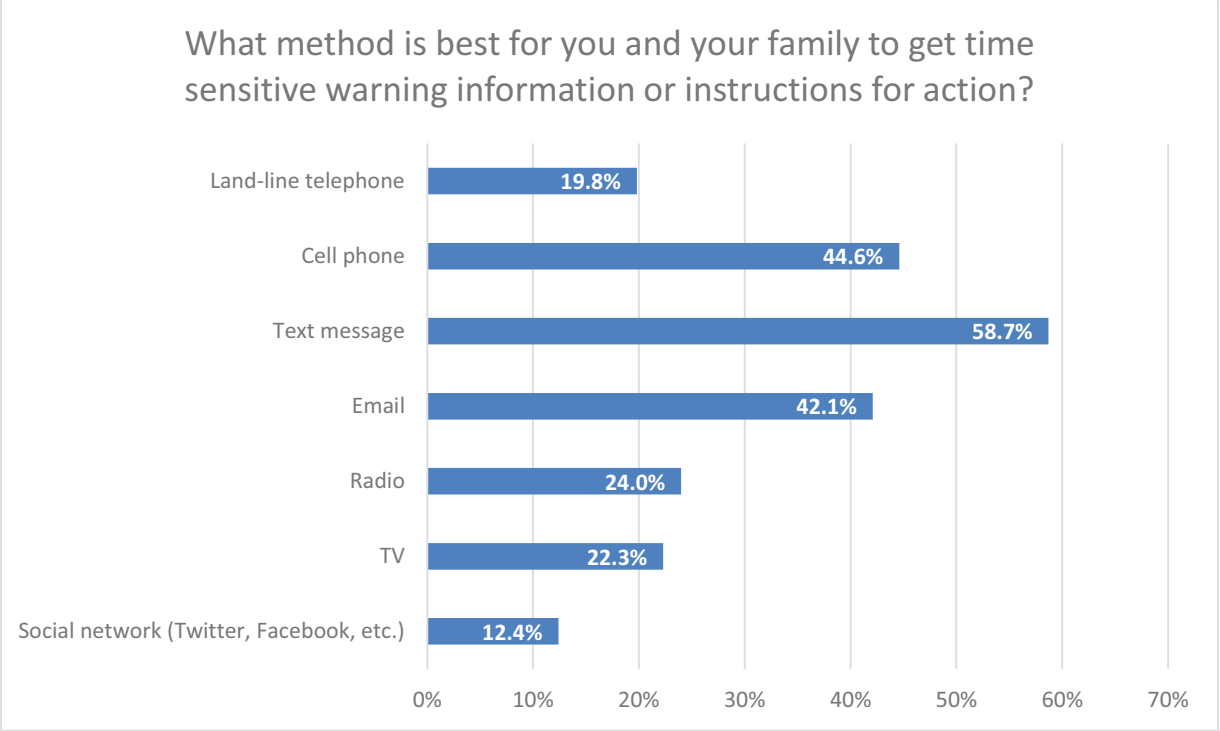
Question 13

Choose five of the following methods you think are most effective for providing flood hazard and disaster information? (Choose up to 5 answers)		
Answer Options	**Response Percent**	**Response Count**
Newspaper	21.5%	26
Telephone Book	0.8%	1
Informational Brochures	19.0%	23
Local Government Newsletters	22.3%	27
Public Meetings	29.8%	36
Workshops	7.4%	9
Schools	9.9%	12
TV News	47.9%	58
TV Ads	10.7%	13
Radio News	43.8%	53
Radio Ads	18.2%	22
Internet	52.1%	63
Outdoor Advertisements	4.1%	5
Fire Department/Rescue	15.7%	19
Law Enforcement	6.6%	8
Faith-based Institutions	2.5%	3
CERT Classes	16.5%	20
Public Awareness Campaign (e.g., Flood Awareness Week, Winter Storm Preparedness Month)	32.2%	39
Books	2.5%	3
Chamber of Commerce	0.0%	0
Academic Institutions	1.7%	2
Public Library	8.3%	10
Red Cross Information	9.9%	12
Community Safety Events	16.5%	20
Fair Booths	3.3%	4
Word of Mouth	8.3%	10
Social Media (Twitter, Facebook, etc.)	32.2%	39
Other (please specify)	5.8%	7
	answered question	**121**
	skipped question	**15**


Choose five of the following methods you think are most effective for providing flood hazard and disaster information? (Choose up to 5 answers)
Other (please specify) 5.8%
Social Media (Twitter, Facebook, etc.) 32.2%
Word of Mouth 8.3%
Fair Booths 3.3%
Community Safety Events 16.5%
Red Cross Information 9.9%
Public Library 8.3%
Academic Institutions 1.7%
Chamber of Commerce 0.0%
Books 2.5%
Public Awareness Campaign (e.g.,... 32.2%
CERT Classes 16.5%
Faith-based Institutions 2.5%
Law Enforcement 6.6%
Fire Department/Rescue 15.7%
Outdoor Advertisements 4.1%
Internet 52.1%
Radio Ads 18.2%
Radio News 43.8%
TV Ads 10.7%
TV News 47.9%
Schools 9.9%
Workshops 7.4%
Public Meetings 29.8%
Local Government Newsletters 22.3%
Informational Brochures 19.0%
Telephone Book 0.8%
Newspaper 21.5%
0%
10%
20%
30%
40%
50%
60%

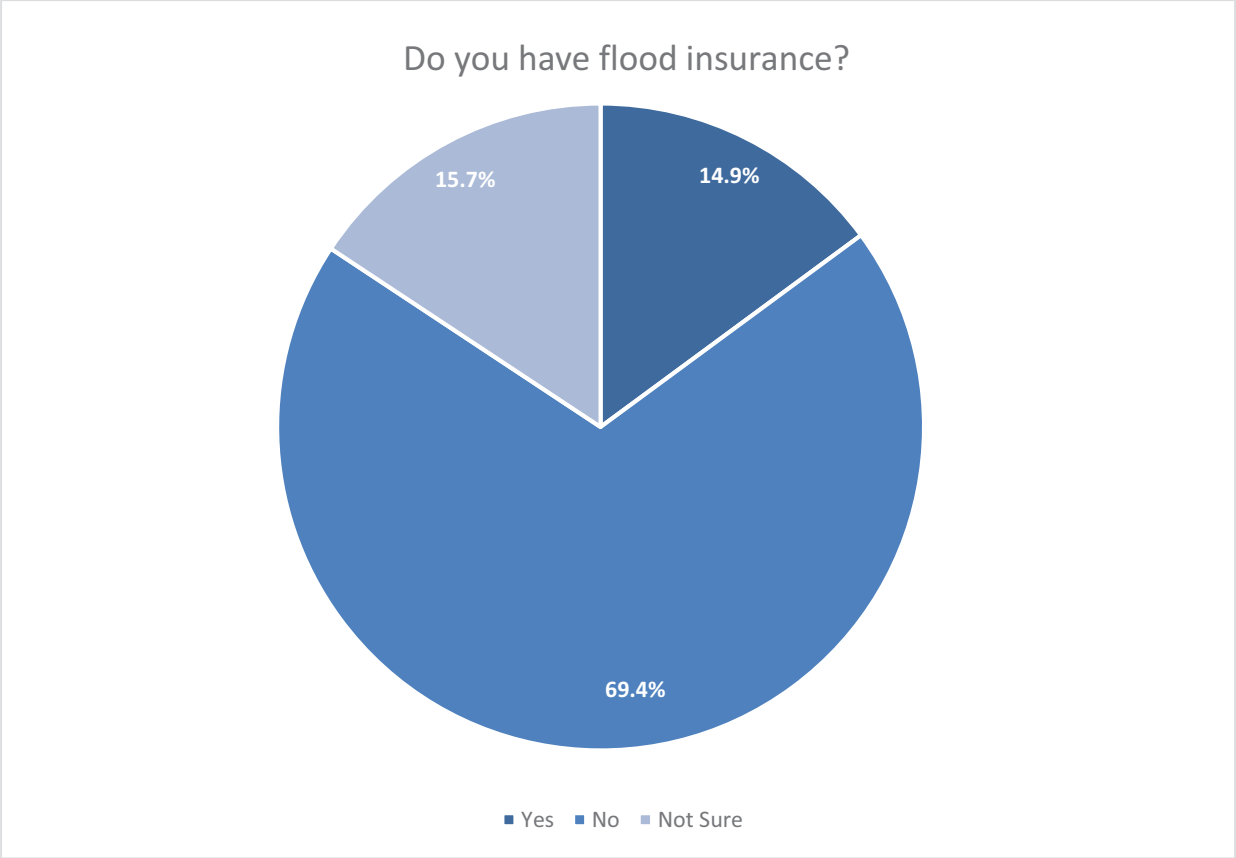
Question 14

What method is best for you and your family to get time sensitive warning information or instructions for action?		
Answer Options	**Response Percent**	**Response Count**
Land-line telephone	19.8%	24
Cell phone	44.6%	54
Text message	58.7%	71
Email	42.1%	51
Radio	24.0%	29
TV	22.3%	27
Social network (Twitter, Facebook, etc.)	12.4%	15
Other (please specify)		4
	answered question	**121**
	skipped question	**15**



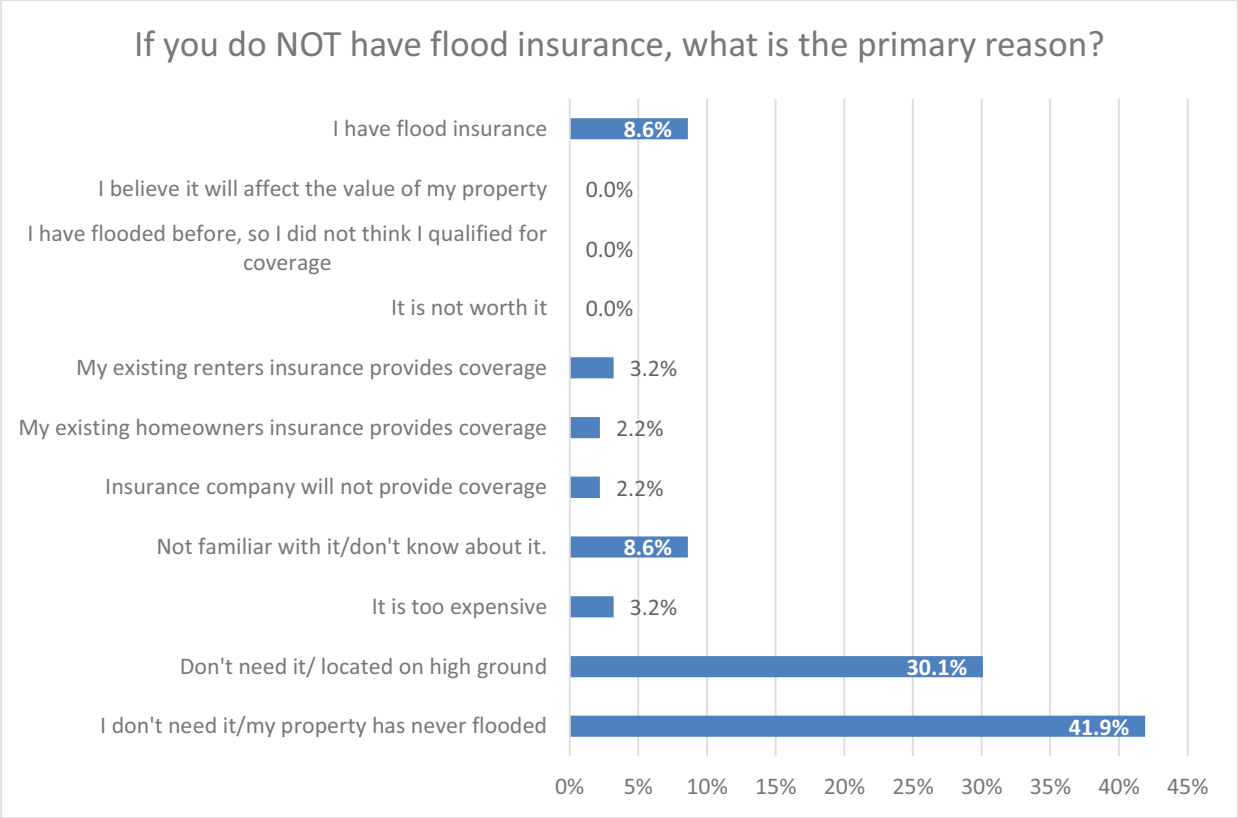
Question 15

Do you have flood insurance?		
Answer Options	**Response Percent**	**Response Count**
Yes	14.9%	18
No	69.4%	84
Not Sure	15.7%	19
	answered question	**121**
	skipped question	**15**



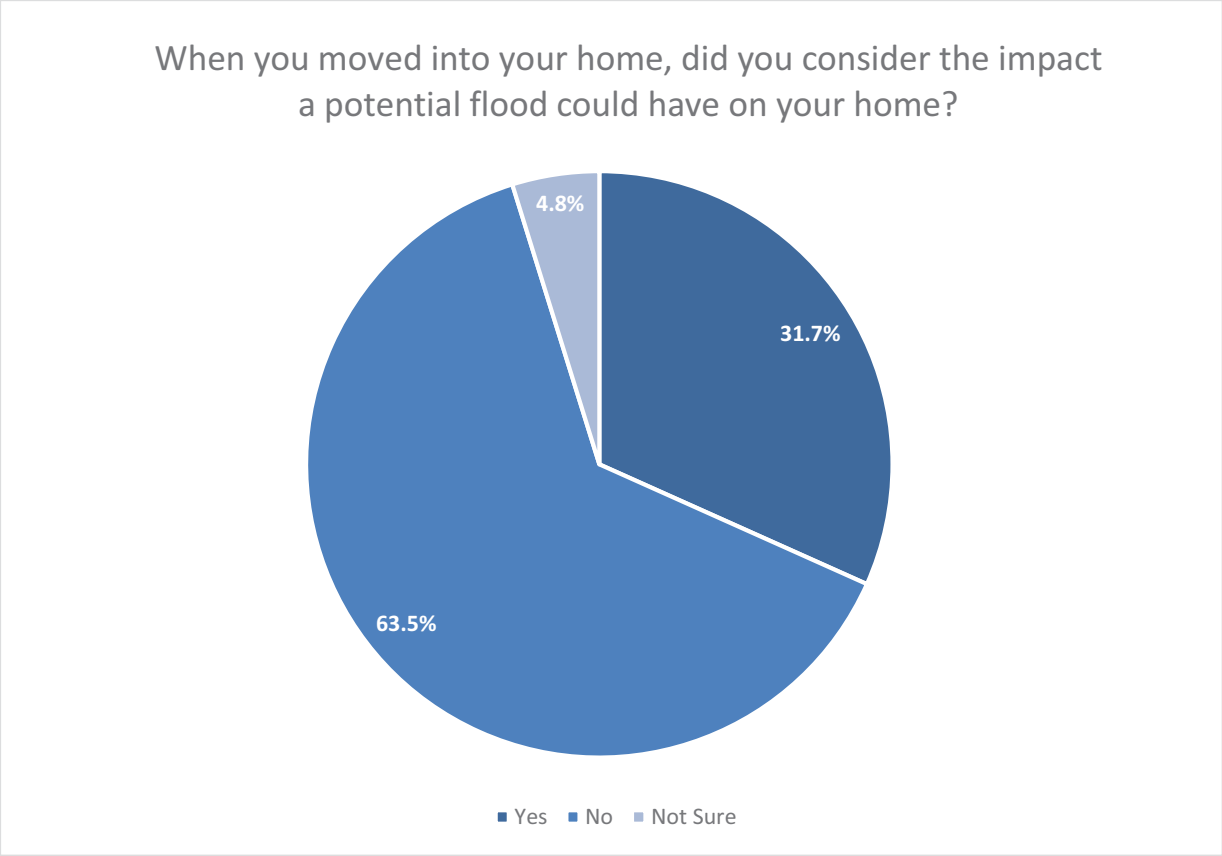
Question 16

If you do NOT have flood insurance, what is the primary reason?		
Answer Options	**Response Percent**	**Response Count**
I don't need it/my property has never flooded	41.9%	39
Don't need it/ located on high ground	30.1%	28
It is too expensive	3.2%	3
Not familiar with it/don't know about it.	8.6%	8
Insurance company will not provide coverage	2.2%	2
My existing homeowners insurance provides coverage	2.2%	2
My existing renters insurance provides coverage	3.2%	3
It is not worth it	0.0%	0
I have flooded before, so I did not think I qualified for coverage	0.0%	0
I believe it will affect the value of my property	0.0%	0
I have flood insurance	8.6%	8
Other (please specify)		7
	answered question	**93**
	skipped question	**43**



Question 17

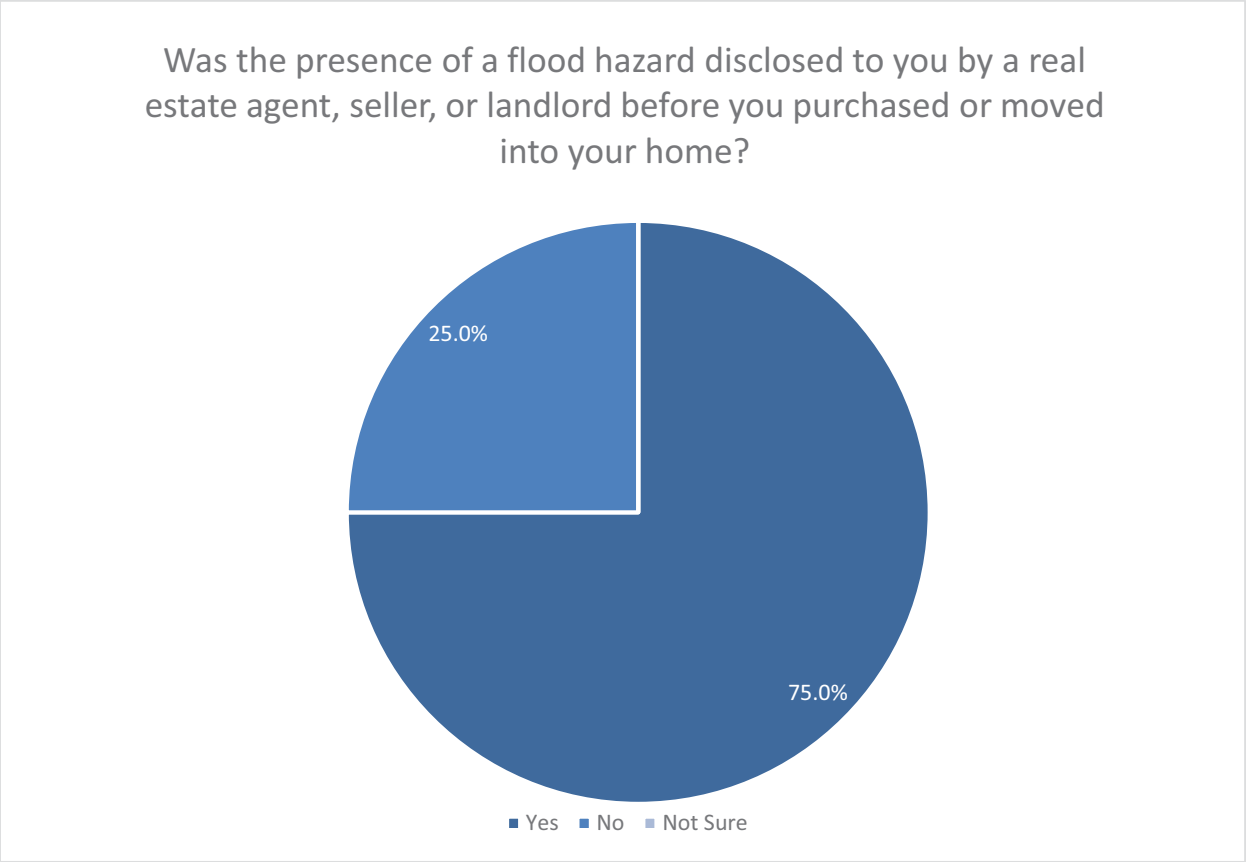
When you moved into your home, did you consider the impact a potential flood could have on your home?		
Answer Options	**Response Percent**	**Response Count**
Yes	31.7%	33
No	63.5%	66
Not Sure	4.8%	5
	answered question	**104**
	skipped question	**32**



Question 18

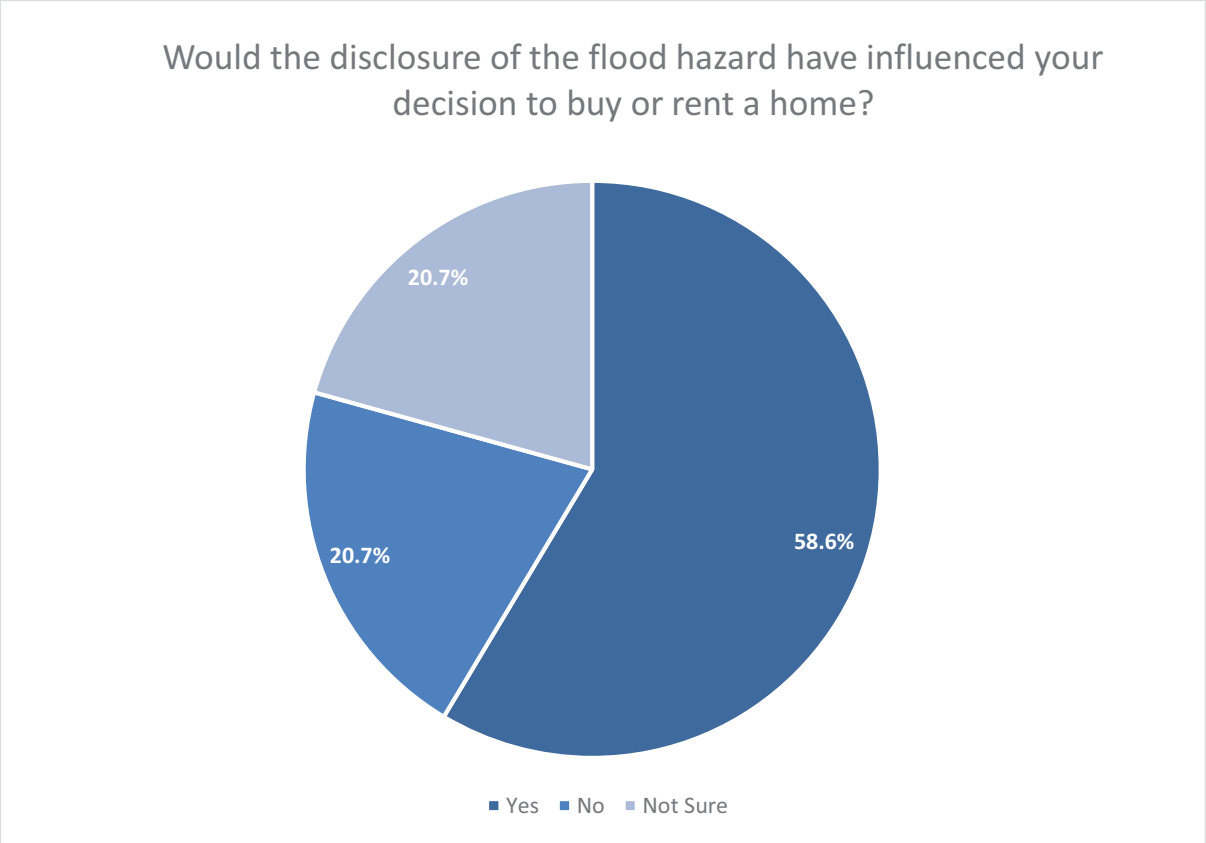
Was the presence of a flood hazard disclosed to you by a real estate agent, seller, or landlord before you purchased or moved into your home?		
Answer Options	**Response Percent**	**Response Count**
Yes	75.0%	6
No	25.0%	2
Not Sure	0.0%	0
	answered question	**8**
	skipped question	**3**

Note: Only responses from residents located in the floodplain are indicated here.



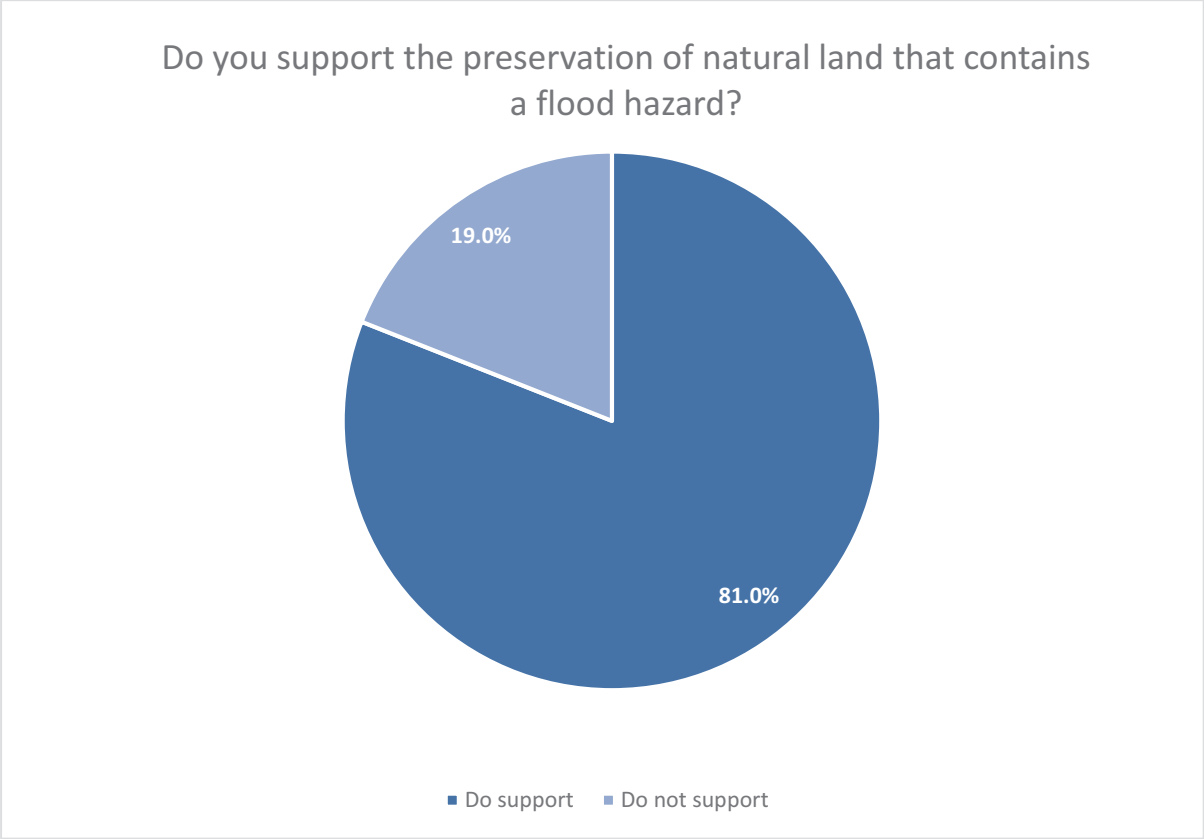
Question 19

Would the disclosure of the flood hazard have influenced your decision to buy or rent a home?		
Answer Options	**Response Percent**	**Response Count**
Yes	58.6%	65
No	20.7%	23
Not Sure	20.7%	23
	answered question	**111**
	skipped question	**25**



Question 20

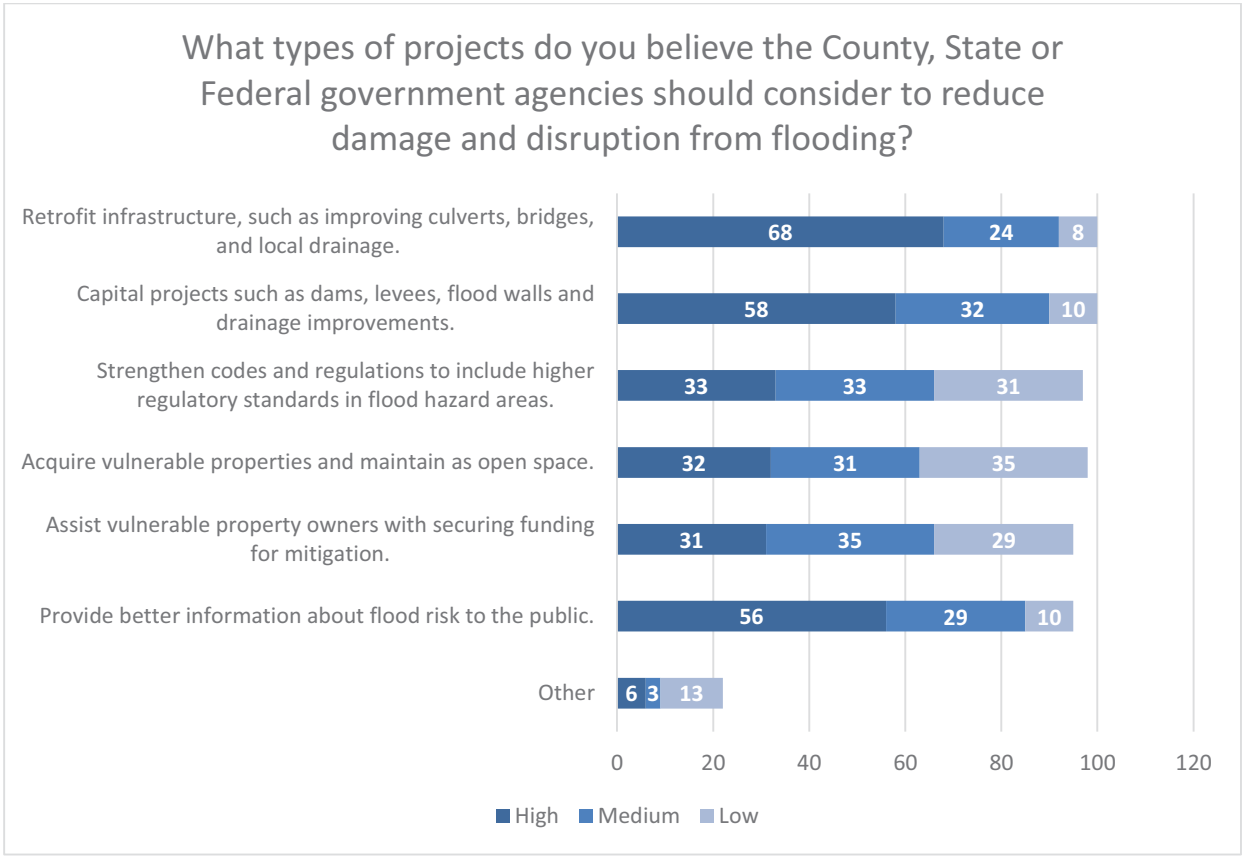
Do you support the preservation of natural land that contains a flood hazard?		
Answer Options	**Response Percent**	**Response Count**
Do support	81.0%	81
Do not support	19.0%	19
	answered question	**100**
	skipped question	**36**



Question 21

What types of projects do you believe the County, State or Federal government agencies should consider to reduce damage and disruption from flooding?

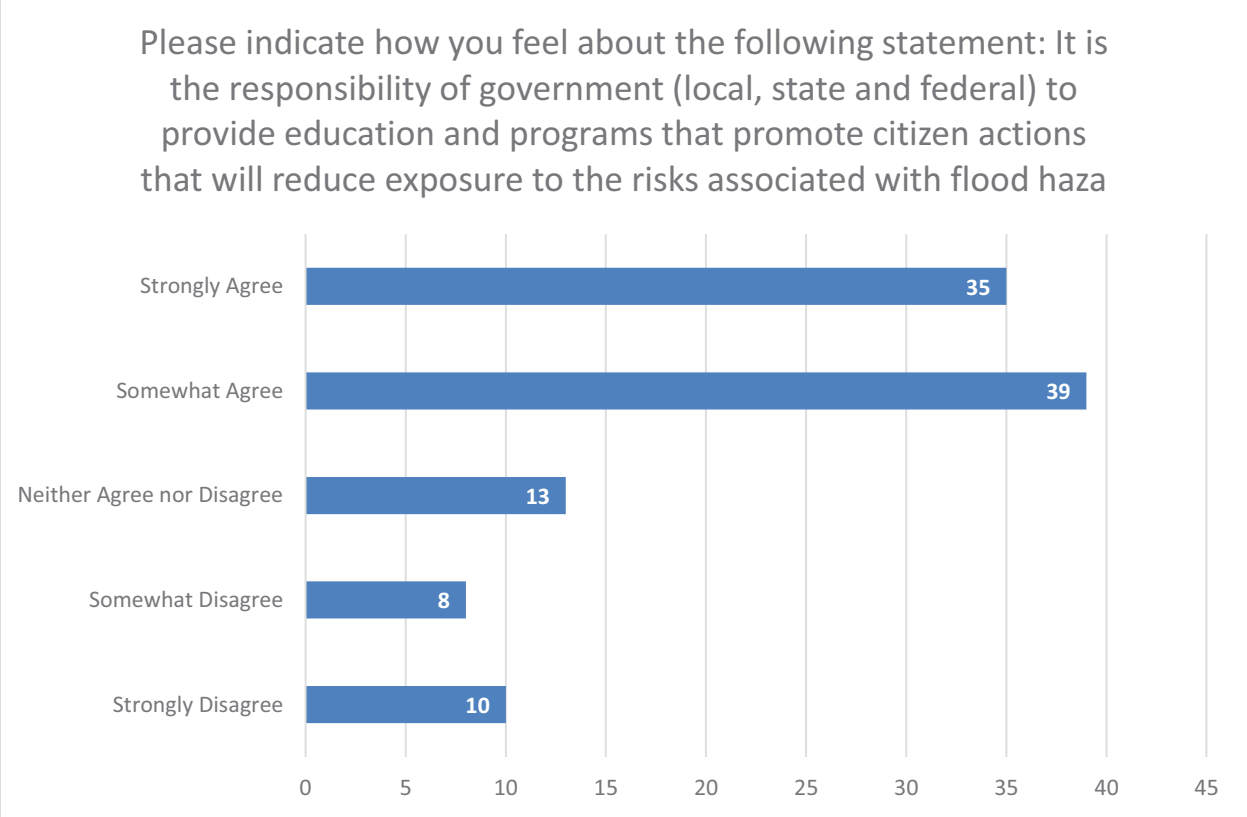
Answer Options	High	Medium	Low	Rating Average	Response Count
Retrofit infrastructure, such as improving culverts, bridges, and local drainage.	68	24	8	1.40	100
Capital projects such as dams, levees, floodwalls and drainage improvements.	58	32	10	1.52	100
Strengthen codes and regulations to include higher regulatory standards in flood hazard areas.	33	33	31	1.98	97
Acquire vulnerable properties and maintain as open space.	32	31	35	2.03	98
Assist vulnerable property owners with securing funding for mitigation.	31	35	29	1.98	95
Provide better information about flood risk to the public.	56	29	10	1.52	95
Other	6	3	13	2.32	22
(please specify)					4
				answered question	**103**
				skipped question	**33**



Question 22

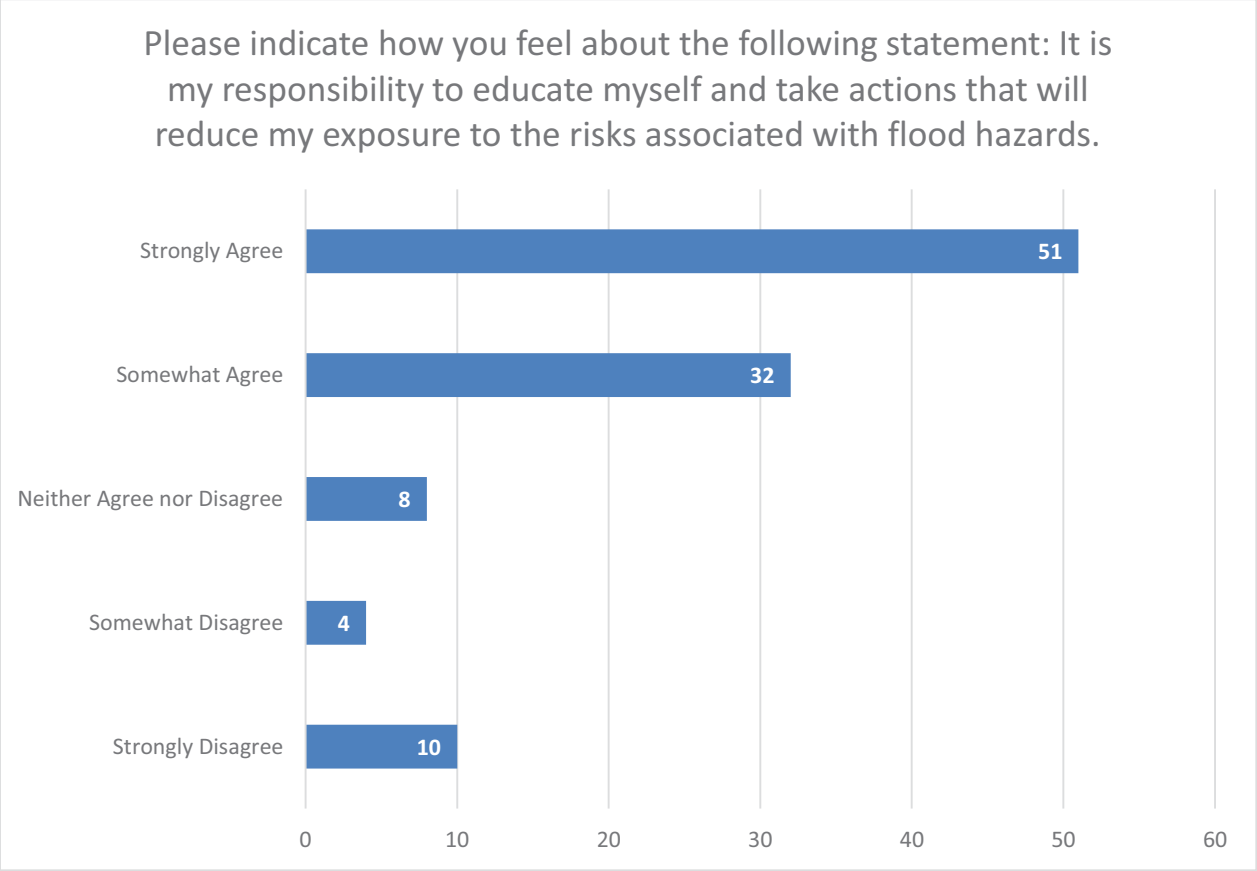
Please indicate how you feel about the following statement: It is the responsibility of government (local, state and federal) to provide education and programs that promote citizen actions that will reduce exposure to the risks associated with flood hazards.

Answer Options	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree	Rating Average	Response Count
Choose one:	10	8	13	39	35	3.77	105
					answered question		**105**
					skipped question		**31**



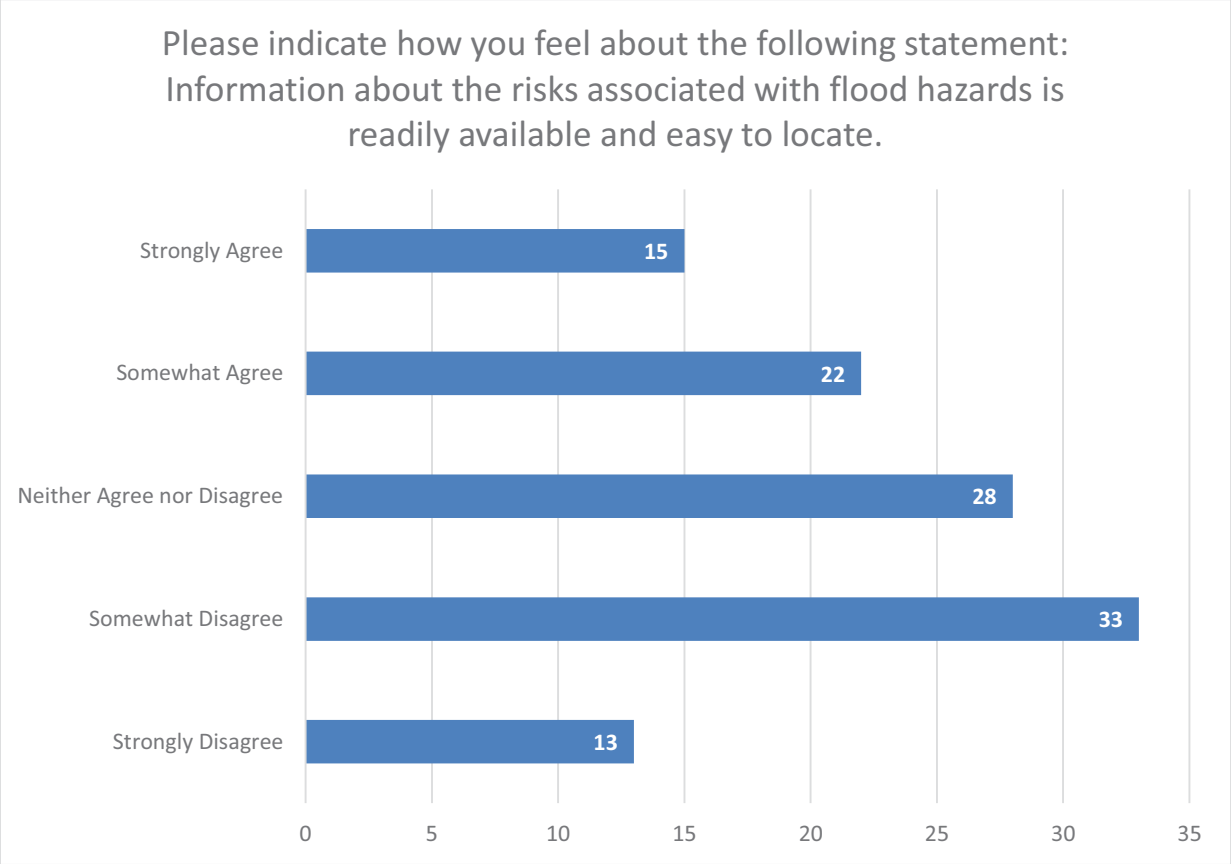
Question 23

Please indicate how you feel about the following statement: It is my responsibility to educate myself and take actions that will reduce my exposure to the risks associated with flood hazards.							
Answer Options	**Strongly Disagree**	**Somewhat Disagree**	**Neither Agree nor Disagree**	**Somewhat Agree**	**Strongly Agree**	**Rating Average**	**Response Count**
Choose one:	10	4	8	32	51	4.05	105
					answered question		**105**
					skipped question		**31**



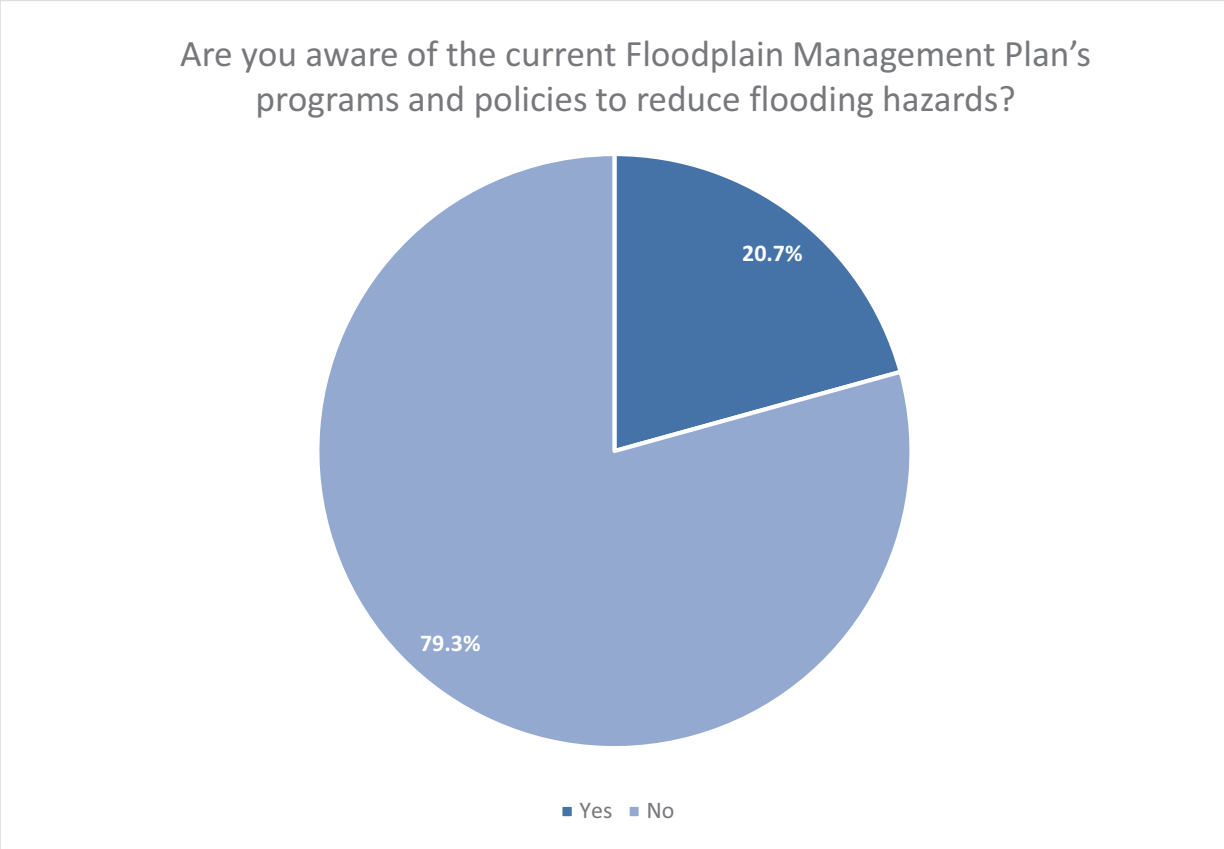
Question 24

Please indicate how you feel about the following statement: Information about the risks associated with flood hazards is readily available and easy to locate.							
Answer Options	**Strongly Disagree**	**Somewhat Disagree**	**Neither Agree nor Disagree**	**Somewhat Agree**	**Strongly Agree**	**Rating Average**	**Response Count**
Choose one:	13	33	28	22	15	2.94	111
					answered question		**111**
					skipped question		**25**



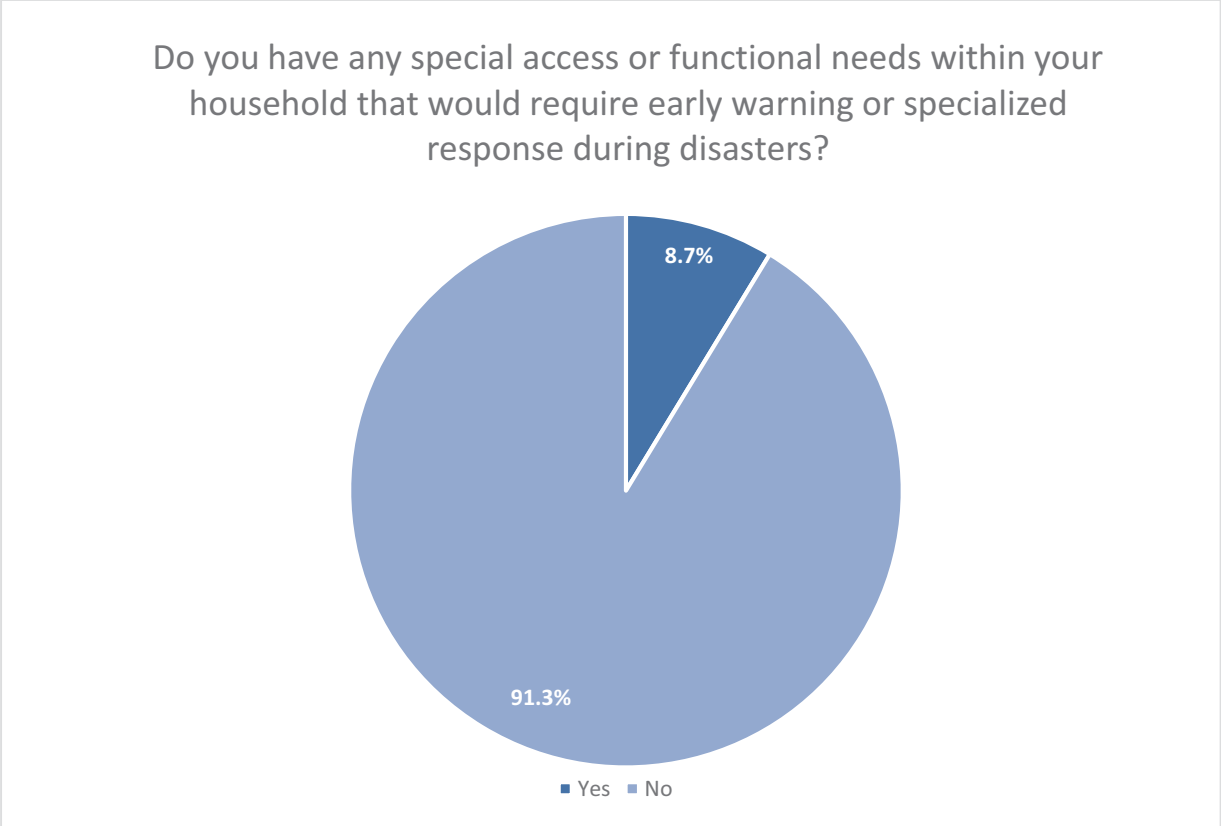
Question 25

Are you aware of the current floodplain management plan's programs and policies to reduce flooding hazards?		
Answer Options	**Response Percent**	**Response Count**
Yes	20.7%	23
No	79.3%	88
Please describe programs and policies of which you are aware		8
	answered question	**111**
	skipped question	**25**



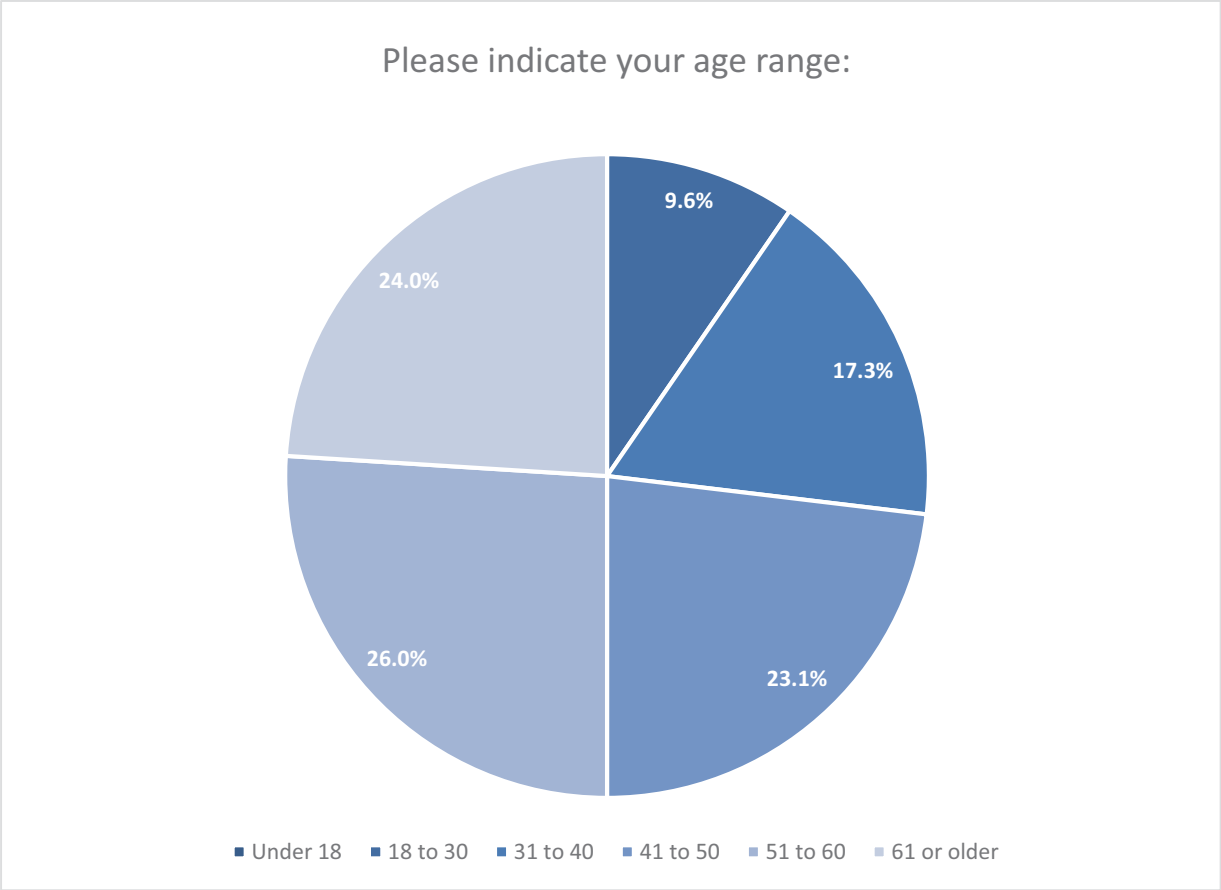
Question 26

Do you have any special access or functional needs within your household that would require early warning or specialized response during disasters?		
Answer Options	**Response Percent**	**Response Count**
Yes	8.7%	9
No	91.3%	95
	answered question	**104**
	skipped question	**32**



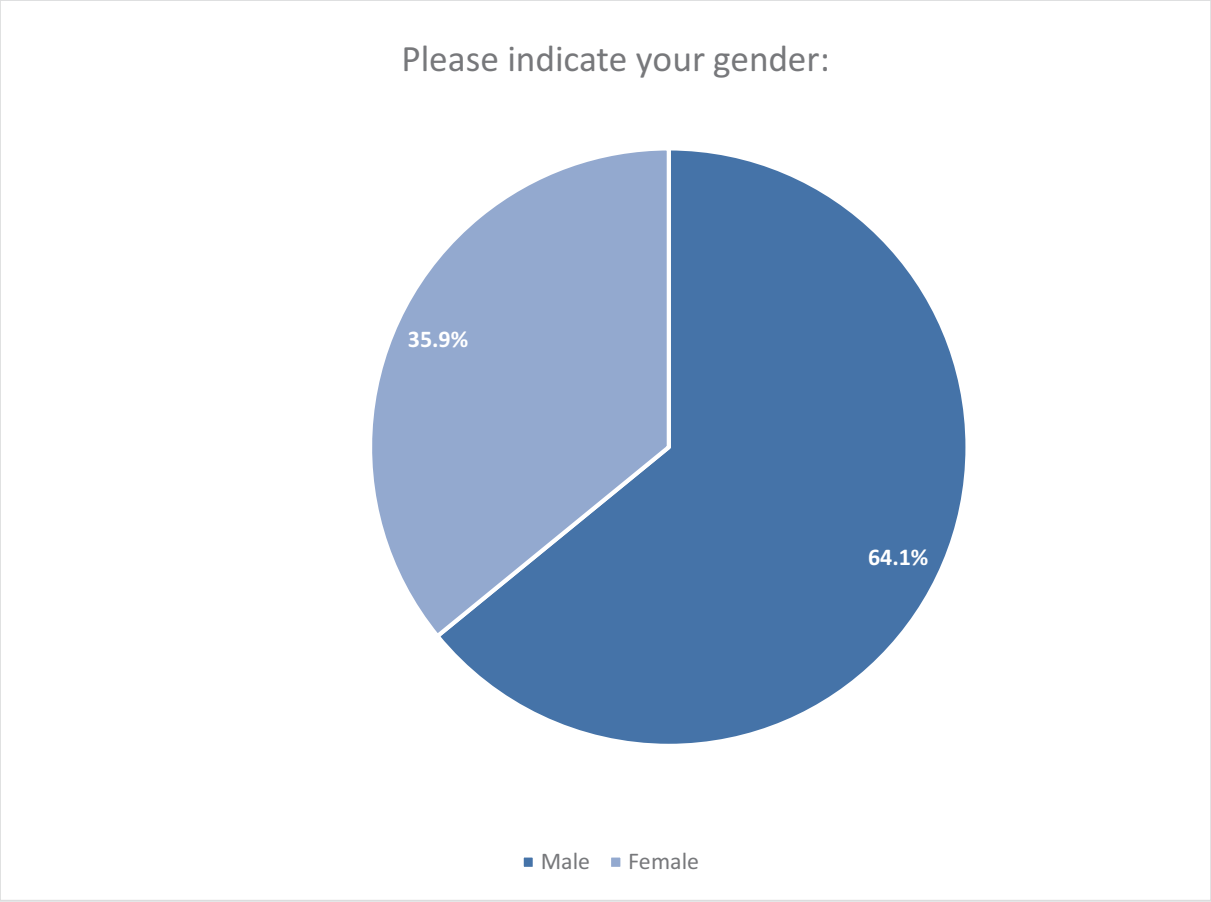
Question 27

Please indicate your age range:		
Answer Options	**Response Percent**	**Response Count**
Under 18	0.0%	0
18 to 30	9.6%	10
31 to 40	17.3%	18
41 to 50	23.1%	24
51 to 60	26.0%	27
61 or older	24.0%	25
	answered question	**104**
	skipped question	**32**



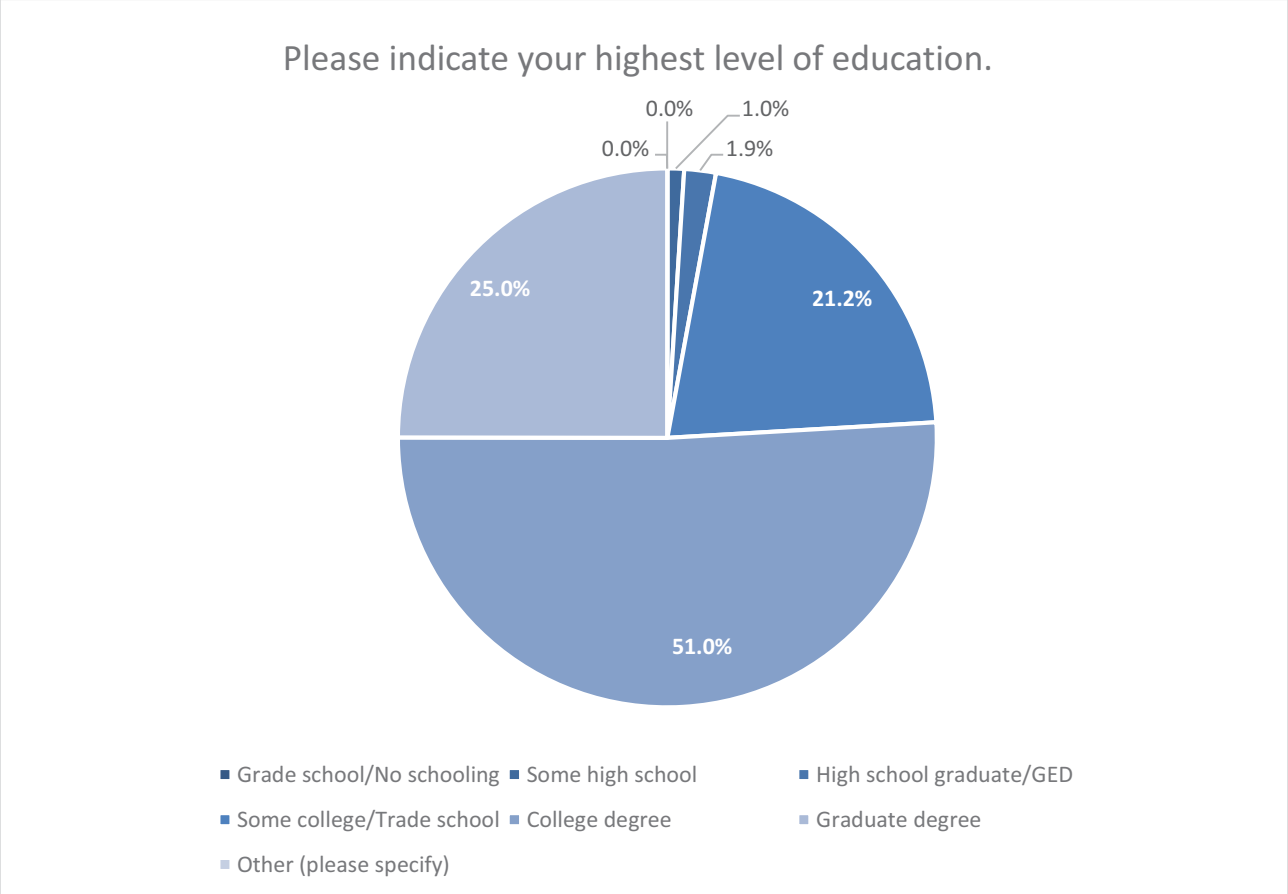
Question 28

Please indicate your gender:		
Answer Options	**Response Percent**	**Response Count**
Male	64.1%	66
Female	35.9%	37
	answered question	**103**
	skipped question	**33**



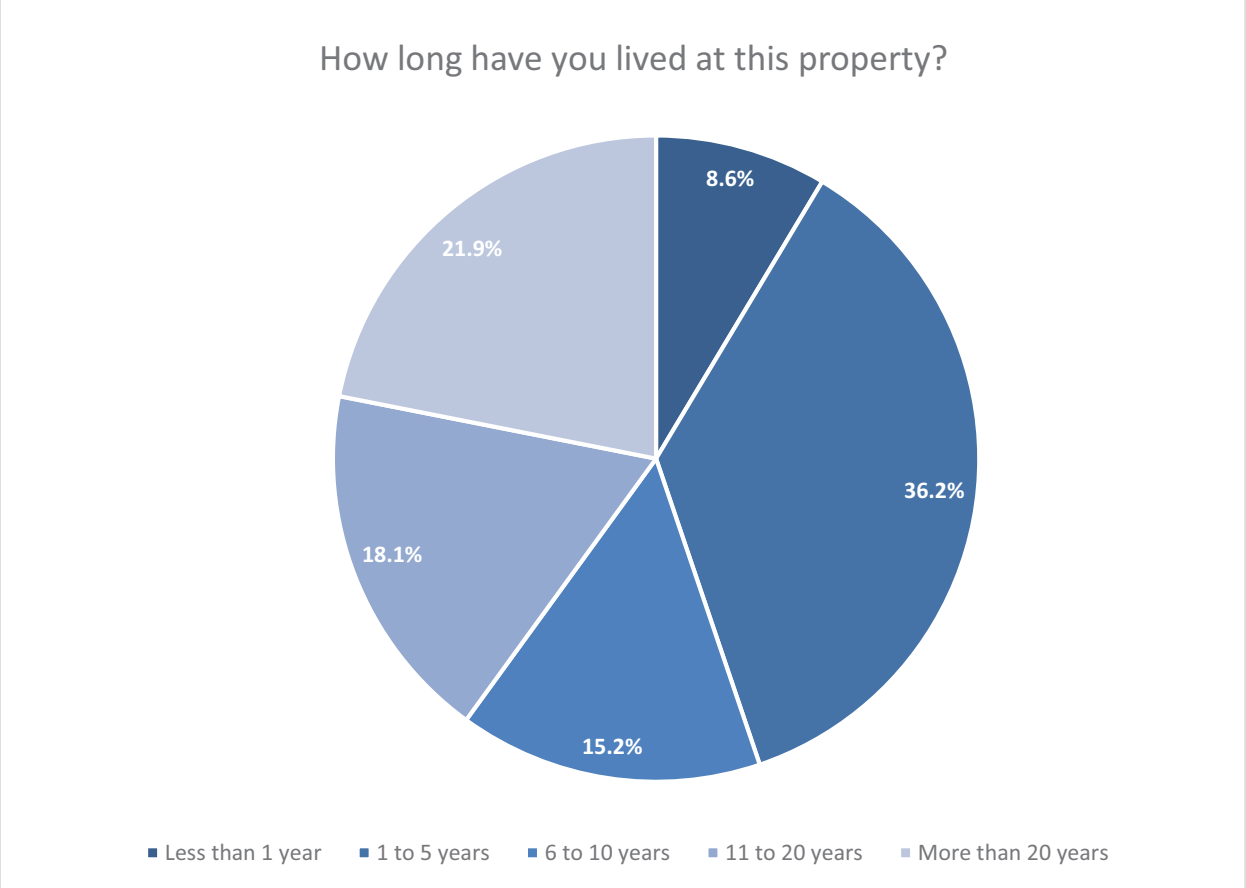
Question 29

Please indicate your highest level of education.		
Answer Options	**Response Percent**	**Response Count**
Grade school/No schooling	0.0%	0
Some high school	1.0%	1
High school graduate/GED	1.9%	2
Some college/Trade school	21.2%	22
College degree	51.0%	53
Graduate degree	25.0%	26
Other (please specify)	0.0%	0
	answered question	**104**
	skipped question	**32**



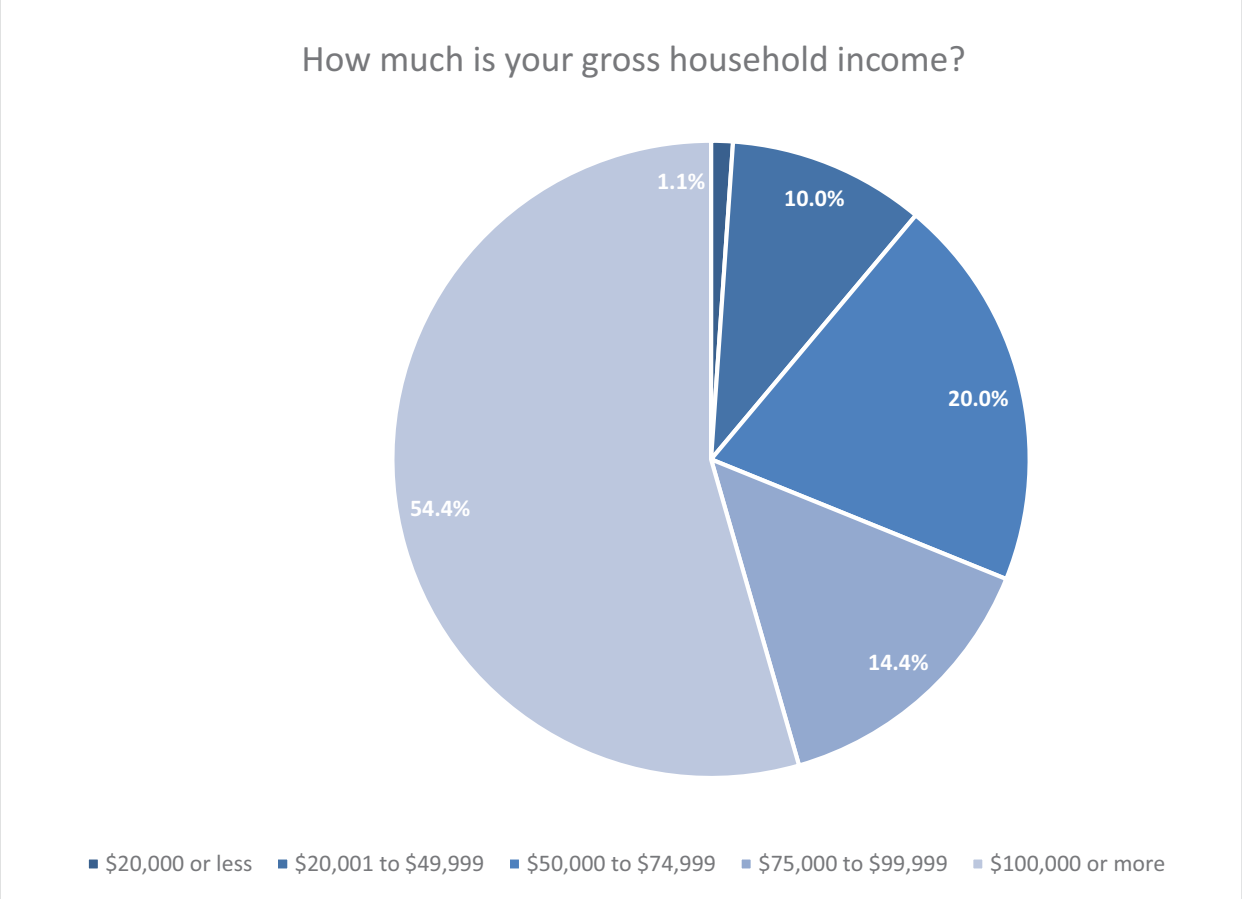
Question 30

How long have you lived at this property?		
Answer Options	**Response Percent**	**Response Count**
Less than 1 year	8.6%	9
1 to 5 years	36.2%	38
6 to 10 years	15.2%	16
11 to 20 years	18.1%	19
More than 20 years	21.9%	23
	answered question	**105**
	skipped question	**31**



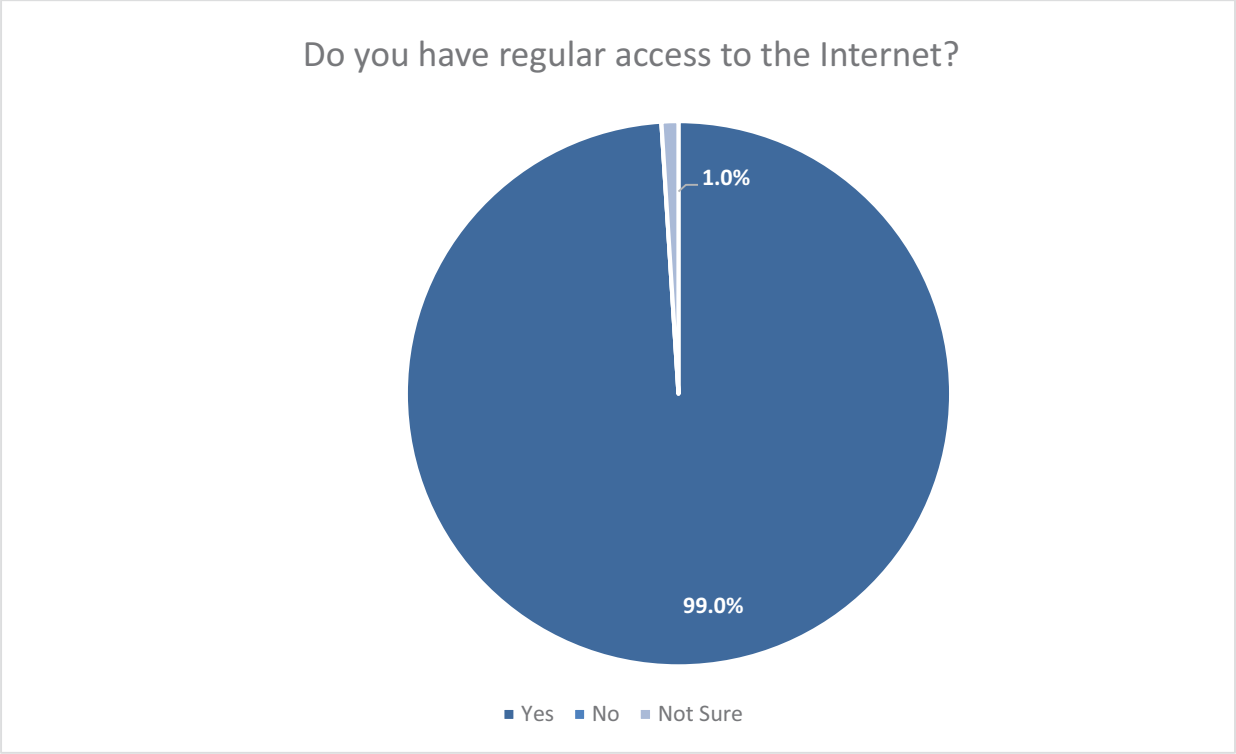
Question 31

How much is your gross household income?		
Answer Options	**Response Percent**	**Response Count**
$20,000 or less	1.1%	1
$20,001 to $49,999	10.0%	9
$50,000 to $74,999	20.0%	18
$75,000 to $99,999	14.4%	13
$100,000 or more	54.4%	49
	answered question	**90**
	skipped question	**46**



Question 32

Do you have regular access to the Internet?		
Answer Options	**Response Percent**	**Response Count**
Yes	99.0%	103
No	0.0%	0
Not Sure	1.0%	1
	answered question	**104**
	skipped question	**32**



Question 33

Comments	
Answer Options	**Response Count**
	17
answered question	**17**
skipped question	**119**